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of the
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H. Preston Hoskins, Secretary-Editor, 221 N. LaSalle St., Chicago, Ill.

Vol. LXXXVII, N. S. Vol. 40 AUGUST, 1935 No. 2

A MEMBER DOES HIS DUTY

If every member of the A. V. M. A. would do what one member did during the past month, we would have absolutely no misgivings concerning the outcome of the deliberations of the House of Representatives at Oklahoma City this month, in the matter of the several amendments to the Constitution and By-laws that have been proposed.

One veterinarian, who takes his membership in the national organization rather seriously, studied the several amendments as outlined in the JOURNAL last month and then sat down and wrote a letter to the delegate from his state. In this letter, the member took up each amendment and stated his position very clearly on four of them. With reference to the other amendment, this member took no position but said that he was perfectly willing to leave the decision to those present at the meeting.

The House of Representatives will have its first tryout under normal conditions at Oklahoma City. The meeting in New York last year was not a normal one, owing to the fact that it was held in conjunction with the Twelfth International Veterinary Congress. This year, the House of Representatives will be in session on at least two occasions and each time there will be sessions of several sections in progress. Although the right to vote in the House of Representatives is restricted to duly accredited

delegates, or their alternates, this does not mean that the meetings are closed to the general membership of the Association. Anyone who has a report to make to the House will be expected to attend, and any member who has business to transact should make it a point to be present. However, it is not expected that the rank and file of those in attendance will desert the sectional meetings to attend the sessions of the House of Representatives. This would spoil the whole idea.

As a matter of fact, one of the primary objects in changing to the new form of government in the A. V. M. A. was the desire to alter the programs of our annual meetings in such a way that more time would be available to the membership at large for reading, hearing and discussing professional papers, at the same time reducing to a minimum the time of the members at large consumed in attending strictly business sessions. It is right here that the real test will come, and the Oklahoma City meeting will afford an opportunity for observing whether the members generally are more interested in literary programs or business meetings.

If you have not already done so, it is suggested that you get in touch with the delegate who will represent your state at the meeting in Oklahoma City and give him your own views on any of the important questions which will come before the House of Representatives. This is your privilège, and you should consider it your duty as well. When each question comes up for final decision, it will be very much easier for your delegate to make up his mind how to vote if his constituents have expressed their views to him. Otherwise, he is very much on his own and, if he does not vote to suit you, this is your fault and not his just as long as you neglect to state your views.

We had expected to be able to publish in this issue of the JOURNAL a list of the delegates and alternates elected by the 47 state associations throughout the country but, although a communication was sent to the secretary of each association asking for this information some time ago, more than one-third of the states have not reported their selections. This is true particularly of those states that were to hold summer meetings the past month. If you do not know who will represent your state at Oklahoma City, get in touch with the secretary of your state association.

It is encouraging to note that several of the state associations that have met recently took action in the matter of instructing their delegates on one or more questions. This was the case with reference to the proposal to admit to active membership in the

A. V. M. A. persons not having a veterinary degree. This seems to be meeting with considerable opposition.

WYOMING CONCLUDES AFFILIATION

The Wyoming Veterinary Medical Association met at Thermopolis, on June 15, 1935, and voted unanimously to affiliate with the A. V. M. A., according to information received from Dr H. D. Port, Secretary-Treasurer. The appointment of a delegate and alternate to the A. V. M. A. House of Representatives was to be announced by the President, Dr. G. D. Anderson, by August 1. With the affiliation of Wyoming, all state associations are now accounted for. With the exception of Idaho, which has no state association, all states in the Union are expected to be represented at the Oklahoma City meeting of the A. V. M. A. House of Representatives this month.

BRINGING THE STOCKMAN AND VETERINARIAN TOGETHER

Stressing the well-known slogan that "the live stock industry is the keystone of American agriculture, and the veterinary profession is its greatest safeguard," the Associated Serum Producers, Inc., 101 West Eleventh Street, Kansas City, Mo., recently announced a greatly enlarged publicity campaign for the coming year.

In addition to the advertisements that are being run in the leading agricultural papers of the country and the programs that are being broadcast over fourteen radio stations, the Association now has available a valuable 44-page booklet entitled "Live Stock Market and Record Handbook." Distribution of the booklet to farmers is through veterinarians only, with the hope that a closer alliance between the farmer and the veterinarian will result.

As with all previous publicity sponsored by this association of twenty manufacturers of anti-hog cholera serum and hog cholera virus, the dangers of lay treatment are emphasized. Farmers and stockmen are urged to consult their veterinarians at all times, and it is hoped that the handbook, together with the attendant publicity, will bring owners of live stock right into the office of the veterinarian. By doing so, the result should be a constantly increasing demand for the veterinarian's services.

Veterinarians are urged to place their orders for the booklet at once. Lots of ten will be mailed, all postage paid, to veterinarians only, upon request. As each lot is exhausted, more will be supplied.

EXECUTIVE BOARD ELECTION

The special election being held in Executive Board District 4 —the South—is attracting an unusual amount of attention if we may judge by the number of ballots being received. Every one of the five candidates is well known to the electorate in District 4 and this undoubtedly accounts for the heavy voting. In the discussions that have taken place relative to the proposal to elect the president of the A. V. M. A. by mail ballot, several members have offered as an objection the fact that they might frequently be called upon to vote for candidates unknown to them. In a recent election in another Executive Board district, one member returned his ballot to the Secretary with the request that the latter cast it in favor of the best man. The member went on to say that he did not know a single one of the candidates. However, this does not often happen, although in every election many members fail to vote for one reason or another. The polls for the election in District 4 will remain open until August 24.

THREE MORE STATES ACCREDITED

Florida, Missouri and Arkansas have been recognized as modified accredited areas by the U. S. Department of Agriculture, according to an announcement dated July 8. This reflects the accelerated progress of tuberculosis eradication in recent months, since this is the first instance in which the Department has designated three states in one announcement. There are now 22 states recognized as modified accredited areas. The 19 others are: North Carolina, Maine, Michigan, Indiana, Wisconsin, Ohio, Idaho, North Dakota, Nevada, New Hampshire, Utah, Kentucky, West Virginia, Washington, Illinois, Oregon, Virginia, Minnesota and Kansas.

Florida is the first state on the Gulf of Mexico and the fifth on the Atlantic Seaboard to be accredited. The first county to become a modified accredited area in this state was Monroe County, in February, 1931. This is the farthest south of any county in the United States, where most of the cattle are located

on an island in the Gulf about 100 miles from the mainland. Missouri and Arkansas were similarly accredited on the same day. The last cow to receive the tuberculin test in Missouri was injected by Dr. D. F. Luckey, former state veterinarian, a pioneer in the use of the intradermic method. In Arkansas, a feature which expedited the testing was the holding of preliminary meetings attended by cattle-owners and veterinarians. At these meetings, all phases of the work were discussed and places for the establishment of chutes were selected. Later, each cattle-owner received a notice informing him of the exact hour, date and place for the testing of his herd.

Tuberculosis among cattle was not serious in any of these states but it was necessary to carry on the testing to determine where infection did exist, and to remove it. With the progress made in these three states and in additional counties in other states, the total number of counties classed as modified accredited areas up to July 3, 1935, was 2,431, a gain of 616 since the corresponding date in 1934.

SKIRVIN COURT, OKLAHOMA CITY, WHERE GENERAL SESSIONS AND BANQUET WILL BE HELD AND THE EXHIBITS HOUSED

EXHIBITORS AT OKLAHOMA CITY

ABBOTT LABORATORIES, North Chicago, Ill.
Pharmaceuticals

BAUSCH AND LOMB OPTICAL CO., Rochester, N. Y.
Microscopes

BECTON, DICKINSON AND CO., Rutherford, N. J.
Syringes, thermometers

CORN STATES SERUM CO., Omaha, Neb.
Anti-hog cholera serum

CUTTER LABORATORY, Berkeley, Calif.
Biologicals

FORT DODGE LABORATORIES, Fort Dodge, Iowa
Biologicals and pharmaceuticals

GENERAL ELECTRIC X-RAY CORPORATION, Chicago, Ill.
X-ray equipment

HAVER-GLOVER LABORATORIES, Kansas City, Mo.
Biologicals and pharmaceuticals

JENSEN-SALSBERY LABORATORIES, INC., Kansas City, Mo.
Biologicals and pharmaceuticals

LEDERLE LABORATORIES, INC., New York, N. Y.
Biologicals and pharmaceuticals

ASHE LOCKHART, INC., Kansas City, Mo.
Biologicals

NATIONAL BAND AND TAG CO., INC., Newport, Ky.
Leg-bands and ear-tags

NORDEN LABORATORIES, Lincoln, Neb.
Biologicals and pharmaceuticals

PITMAN-MOORE COMPANY, Indianapolis, Ind.
Biologicals and pharmaceuticals

E. R. SQUIBB AND SONS, New York, N. Y.
Pharmaceuticals

R. J. STRASENBURGH CO., Rochester, N. Y.
Pharmaceuticals

SWIFT AND COMPANY, Chicago, Ill.
"Pard" dog food

WILSON AND CO., INC., Chicago, Ill.
"Ideal" dog food

LITERARY PROGRAM FOR OKLAHOMA CITY MEETING

General Session

Recent Developments in the Army Veterinary Corps—Col. Robert J. Foster, V. C., U. S. A., Surgeon General's Office, Washington, D. C.

The Nation-Wide Campaign to Control Bang's Disease—Dr. A. E. Wight, Chief, Tuberculosis Eradication Division, U. S. Bureau of Animal Industry, Washington, D. C.

The Veterinary Service of the United States—Dr. L. A. Merillat, Chicago, Ill.

Section on General Practice

Reproductive Hormone Therapy in Domestic Animals—Dr. George H. Hart, University of California, Davis, Calif.

Artificial Insemination in Cattle—Dr. H. E. Kingman, Wyoming Hereford Ranch, Cheyenne, Wyo.

Sterility in Cows and Mares—Dr. Ernest C. Deubler, Newtown, Pa.

Staphylococcic Mastitis (Illustrated) — Dr. Ralph B. Little, Rockefeller Institute, Princeton, N. J.

Periodic Ophthalmia—Dr. C. J. Marshall, University of Pennsylvania, Philadelphia, Pa.

X-Rays as a Diagnostic Aid—Lt. George Townley Price, V. C., U. S. A., Fort Sam Houston, Texas.

Swine Erysipelas—Dr. T. W. Munce, Allied Laboratories, Inc., Sioux City, Iowa.

Section on Small Animals

Heart Worms in Dogs—Dr. J. L. Ruble, Orlando, Fla.

Demodex Folliculorum Canis: Its Diagnosis and Treatment—Dr. M. L. Morris, New Brunswick, N. J.

The Care and Treatment of Caged Birds—Dr. Cliff D. Carpenter, Los Angeles, Calif.

Internal Hydrocephalus in Dogs—Dr. C. F. Schlotthauer, Mayo Foundation, Rochester, Minn.

The American Greyhound—Dr. W. B. Redman, Dow City, Iowa.

Gastro-enteritis in Dogs—Dr. James B. Harrison, Portland, Ore.

Canine Typhus–An Anemia of Dogs—Dr. A. A. Hermann, Denver, Colo.

Dextrose Therapy in Canine Medicine—Dr. Otto Stader, Geneva, Ill.

Intravenous Use of Hydrochloric Acid—Dr. M. M. Leonard, Asheville, N. C.

The Evaluation of Canine Distemper Virus and Antiserum—Dr. N. J. Pyle, Pearl River, N. Y.

Section on Research

A Study of the Channels of Brucella Infection in Bulls—Dr. A. L. Delez, Purdue University, Lafayette, Ind.

Studies on the Epidemiology of Pseudorabies (Illustrated)—Dr. Richard E. Shope, Rockefeller Institute for Medical Research, Princeton, N. J.

Immunization Against Virus Diseases with Tissue Vaccines—Dr. W. H. Boynton, University of California, Berkeley, Calif.

Allergy in Domestic Animals—Dr. Alexander Zeissig, New York State Veterinary College, Ithaca, N. Y.

Hemocytoblastosis: Its Importance in the Development of Fowl Paralysis and Leukemia (Illustrated)—Dr. M. W. Emmel, University of Florida, Gainesville, Fla.

Fowl Leukosis—Dr. F. D. Patterson, Iowa State College, Ames, Iowa.

Studies on Bovine Mastitis—Dr. L. E. Starr, Virginia Polytechnic Institute, Blacksburg, Va.

Supplementing Soil with Iron and Copper for the Prevention of Anemia in Young Pigs—Dr. L. H. Moe, W. A. Craft and C. P. Thompson, Oklahoma Agricultural Experiment Station, Stillwater, Okla.

Section on Poultry

An Outbreak of Acute Swine Erysipelas Infection in Turkeys—Dr. F. R. Beaudette, New Jersey Agricultural Station, New Brunswick, N. J.

Observations on Pendulous Crops of Turkeys—Dr. W. R. Hinshaw and V. S. Asmundson, University of California, Davis, Calif.

Lymphocytoma and Fowl Paralysis of the Domestic Fowl—Dr. R. Fenstermacher, University of Minnesota, Saint Paul, Minn.

Studies on the Egg-Propagated Viruses of Infectious Laryngotracheitis and Fowl-Pox—Dr. C. A. Brandly, Kansas State College, Manhattan, Kan.

PROGRAM FOR CLINIC AT OKLAHOMA CITY

Laboratory and Clinical Demonstrations
Dr. S. L. Stewart, Olathe, Kan., *Directing Chairman*

General Clinic

Milk Hygiene: Equipment for producing certified milk supplied by DeLaval Separator Company in coöperation with the Cherry-Burrell Corporation.

Pathological Display: Dr. J. H. Kitzhofer, U. S. Bureau of Animal Industry, Oklahoma City, Okla., in charge.

Roentgenography: Mr. C. H. Wantz, General Electric X-Ray Corporation, Chicago, Ill., in charge. Demonstrators: Dr. E. J. Frick, Kansas State College, Manhattan, Kan.; Dr. C. J. Marshall, University of Pennsylvania, Philadelphia, Pa., and Lt. George Townley Price, V. C., U. S. A., Fort Sam Houston, Texas.

Laboratory Diagnosis: A completely equipped laboratory for diagnostic purposes will be conducted in conjunction with the various special clinics throughout the entire day.

Special Clinics

SECTION I—Cattle

Dr. W. H. Martin, *Chairman,* El Reno, Okla.

Ten Cases for Diagnosis

Dr. W. L. Boyd, University Farm, Saint Paul, Minn.
Dr. H. E. Kingman, Cheyenne, Wyo.
Dr. C. H. Kitselman, Kansas State College, Manhattan, Kan.
Dr. T. H. Ferguson, Lake Geneva, Wis.

Laboratory Demonstrations

Mastitis
Dr. C. E. Hayden, Cornell University, Ithaca, N. Y.

Anaplasmosis and Piroplasmosis
Dr. H. F. Lienhardt, Kansas State College, Manhattan, Kan.

Parasitisms
Dr. J. D. Ray, Corn States Serum Co., Omaha, Neb.

All-Blood Agglutination Tests: Animal Control; Drawing Blood
Dr. H. Farley, Kansas State College, Manhattan, Kan.

Ascoli Anthrax Test
Dr. Ashe Lockhart, Inc., Kansas City, Mo.

Acetonemia
Dr. C. E. Hayden, Cornell University, Ithaca, N. Y.

Clinical Demonstrations

Uses of Stomach-Tube in Cattle Practice
Pilgrim's Rumen Lavage
Dr. A. H. Gish, Eldorado, Kan.
Dr. P. B. Darlington, Chanute, Kan.
Dr. E. C. Pilgrim, Okmulgee, Okla.
Dr. T. H. Ferguson, Lake Geneva, Wis.

Artificial Insemination of Cow, Including Drawing Semen from the Bull
Dr. W. L. Boyd, University Farm, Saint Paul, Minn.
Dr. H. E. Kingman, Cheyenne, Wyo.
Dr. C. H. Kitselman, Kansas State College, Manhattan, Kan.

General Anesthesia
Spinal Anesthesia, for Teat and Udder Operations
Local Anesthesia, for Teat and Udder Operations
Local Anesthesia, for Painless Dehorning
Dr. T. H. Ferguson, Lake Geneva, Wis.
Dr. A. H. Gish, Eldorado, Kan.
Dr. P. B. Darlington, Chanute, Kan.

Restraint by Different Methods
Field Operations
Use of Emasculatone
Dr. Verne A. Scott, John Tarleton Agricultural College, Stephenville, Texas.
Dr. J. K. Northway, Kingsville, Texas.

Spaying Heifers in Texas
Dr. Verne A. Scott, John Tarleton Agricultural College, Stephenville, Texas.
Dr. J. K. Northway, Kingsville, Texas.

SECTION II—Swine

Dr. E. W. Meads, *Chairman*, Claremore, Okla.

Ten Cases for Diagnosis and Autopsy

Dr. Frank Breed, Norden Laboratories, Lincoln, Neb.
Dr. H. C. H. Kernkamp, University Farm, Saint Paul, Minn.
Dr. H. T. Farmer, Richmond, Va.
Dr. D. W. Hurst, Tecumseh, Neb.

Laboratory Demonstrations

Parasitisms
Dr. J. D. Ray, Corn States Serum Co., Omaha, Neb.

Swine Erysipelas
Dr. T. W. Munce, Allied Laboratories, Sioux City, Iowa.

Swine Brucellosis
Dr. H. Farley, Kansas State College, Manhattan, Kan.

Clinical Demonstrations

Different Methods of Restraint
Anesthesia

1. Per Rectum
2. Per Os
3. Respiratory
4. Caudal

Dr. Wm. C. McConnell, Holdenville, Okla.
Dr. H. T. Farmer, Richmond, Va.

Operations

Scrotal Hernia
Umbilical Hernia
Cesarean Section—Pregnant Sow
Scirrhous Cord
Inguinal Hernia
Mammary Tumor
Ridgling

Dr. E. R. Frank, Kansas State College, Manhattan, Kan.
Dr. J. T. Alston, Tupelo, Miss.
Dr. Wm. C. McConnell, Holdenville, Okla.
Dr. W. F. Guard, Ohio State University, Columbus, Ohio.

SECTION III—Small Animals

Dr. N. W. Ayers, *Chairman*, Oklahoma City, Okla.

Ten Cases for Diagnosis

Dr. J. V. Lacroix, Evanston, Ill.
Dr. H. J. Milks, Cornell University, Ithaca, N. Y.
Dr. O. E. McKim, Port Chester, N. Y.

Laboratory Demonstrations

Urinalysis
Dr. E. E. Leasure, Kansas State College, Manhattan, Kan.

Parasitisms
Dr. J. D. Ray, Corn States Serum Co., Omaha, Neb.

Dirofilaria and Coccidiosis
Dr. A. A. Lenert, College Station, Texas.

Removal of Brain
Negri Bodies
Dr. R. C. Dunn, College Station, Texas.

Clinical Demonstrations

Anesthesia: General; Local; Nerve-Blocking; Intraspinal
Dr. E. J. Frick, Kansas State College, Manhattan, Kan.
Dr. J. C. Flynn, Kansas City, Mo.

Urethremphraxis and Urethrostenosis
Dr. J. D. Cozzens, Santa Monica, Calif.

Entropion Operation
Ectropion Operation
Harder's Gland Operation
Dr. J. D. Cozzens, Santa Monica, Calif.

Blood Transfusion
Dr. C. W. Bower, Topeka, Kan.

Reduction of Fractures
Dr. Hamlet Moore, New Orleans, La.
Dr. C. W. Bower, Topeka, Kan.

Methods of Restraint and Treatment
Lavage and Gavage in Dog and Cat
Dr. E. J. Frick, Kansas State College, Manhattan, Kan.
Dr. J. C. Flynn, Kansas City, Mo.

Autopsy Technic
Dr. H. W. Young, Kansas City, Mo.

SECTION IV—Horses

Dr. G. A. Cunningham, *Chairman*, Lawton, Okla.

Ten Cases for Diagnosis

Dr. L. A. Merillat, Haver-Glover Laboratories, Chicago, Ill., in charge.

Laboratory Demonstrations

Diagnosis of Pregnancy
Dr. C. E. Salsbery, Jen-Sal Laboratories, Kansas City, Mo.

Blood Tests for Equine Abortion
Dr. H. Farley, Kansas State College, Manhattan, Kan.

Parasitisms
Dr. J. D. Ray, Corn States Serum Co., Omaha, Neb.

Test for Infectious Anemia of Horses
Dr. Cecil Elder, University of Missouri, Columbia, Mo.
Dr. H. J. Shore, Fort Dodge Serum Co., Fort Dodge, Iowa.

Clinical Demonstrations

Passing the Stomach-Tube
Nerve-Blocking for Dental Operations
Physical Examination for Pregnancy
Dr. W. F. Guard, Ohio State University, Columbus, Ohio.
Dr. R. R. Dykstra, Kansas State College, Manhattan, Kan.

Intraspinal Injection of Tetanus Antitoxin
Anesthesia
1. Intravenous
2. Inhalation
3. Intraspinal
Dr. E. R. Frank, Kansas State College, Manhattan, Kan.
Dr. T. A. Sigler, Greencastle, Ind.

Operation for Roaring
Dr. W. M. Smotherman, Huntsville, Texas.

Administering Capsules for Bots and Other Internal Parasites
Passing Nasal Tube and Administering Liquids
Dr. F. H. Suits, Odessa, Mo.
Dr. E. L. Dicke, Louisburg, Kan.

Nerve-Blocking and Firing
Dr. T. A. Sigler, Greencastle, Ind.
Dr. E. R. Frank, Kansas State College, Manhattan, Kan.

SECTION V—Sheep

Dr. E. W. Bowerman, *Chairman*, Oklahoma City, Okla.

Cases for Diagnosis and Autopsy

Dr. I. E. Newsom, Colorado State College, Fort Collins, Colo.
Dr. Floyd Cross, Colorado State College, Fort Collins, Colo.
Dr. I. B. Boughton, Texas Experiment Substation, Sonora, Texas.
Dr. W. T. Hardy, Texas Experiment Substation, Sonora, Texas.
Dr. E. A. Tunnicliff, Montana Veterinary Research Laboratory, Bozeman, Mont.

Laboratory Demonstration

Parasitisms
Dr. J. D. Ray, Corn States Serum Co., Omaha, Neb.
Dr. I. E. Newsom, Colorado State College, Fort Collins, Colo.

Clinical Demonstrations

Dentition from Six Months to Three Years
Physical Examination (Lambing Ewes)
Methods of Tagging
Methods of Medication

Methods of Restraint
Dr. Henry W. Turner, New Hope, Pa.
Dr. E. T. Baker, Moscow, Idaho.

Clipping Machine and Clippers
Mr. J. H. Mills, Chicago Flexible Shaft Co., Chicago, Ill.
Dr. I. E. Newsom, Colorado State College, Fort Collins, Colo.

Operations and Treatments

Foot Rot
Navel Ill
Entropion (Turned Eyelid)
Operators to be selected.

SECTION VI—Poultry

Dr. H. W. Orr, *Chairman*, Stillwater, Okla.

Ten Cases for Diagnosis and Autopsy

Dr. R. L. Mayhew, Louisiana State University, Baton Rouge, La.
Dr. W. R. Hinshaw, University of California, Davis, Calif.
Dr. C. A. Brandly, Kansas State College, Manhattan, Kan.

Laboratory Demonstrations

Agglutination Tests for Pullorum Disease
Hatchability of Eggs
Dr. A. J. Durant, University of Missouri, Columbia, Mo.
Dr. R. L. Mayhew, Louisiana State University, Baton Rouge, La.

Parasitisms
Dr. A. J. Durant, University of Missouri, Columbia, Mo.

Clinical Demonstrations

Blackhead, Enterohepatitis and Other Diseases in Turkeys
Dr. Carl F. Schlotthauer, Mayo Foundation, Rochester, Minn.
Dr. S. H. McNutt, Iowa State College, Ames, Iowa.
Dr. C. A. Brandly, Kansas State College, Manhattan, Kan.
Dr. B. A. Beach, University of Wisconsin, Madison, Wis.

Culling for Egg Production and Quality of Production
Dr. C. A. Brandly, Kansas State College, Manhattan, Kan.
Dr. W. R. Hinshaw, University of California, Davis, Calif.
Dr. B. A. Beach, University of Wisconsin, Madison, Wis.

Sex Diagnosis of Baby Chicks
Demonstrators to be selected.

Display of Fresh Pathological Specimens
Dr. A. J. Durant, University of Missouri, Columbia, Mo.
Dr. J. R. Beach, University of California, Berkeley, Calif.

DR. S. L. STEWART
DIRECTING CHAIRMAN OF CLINICS

APPLICATIONS FOR MEMBERSHIP

This month we are giving first listing to 35 applications for membership filed during the month of July. This not only is a record for the current year but is the best showing for any month since August, 1933, when 37 applications were filed, the majority of these having been secured during the 1933 convention in Chicago. Kansas, with eight applicants, made the best showing in July, under the leadership of Dr. C. B. Clement, of Topeka. South Dakota came in with five applications, secured largely through the efforts of Dr. C. H. Hays, of Pierre. California responded with three, and Missouri, New York, Ohio and Washington scored twice. It is interesting to note that the applications filed this year have been received from 33 states, the District of Columbia, the Philippines, Canal Zone, Puerto Rico and four foreign countries.

(See July, 1935, JOURNAL)

FIRST LISTING

BACON, EMMET S. 730 Woodrow Ave., Wichita, Kan.
D. V. M., Kansas State College, 1920
Vouchers: E. F. Cary and G. W. Ornduff

BATSCHE, JOSEPH H. 3962 Lowry Ave., Cincinnati, Ohio
D. V. M., Cincinnati Veterinary College, 1912
Vouchers: G. W. Famous and F. R. Butz.

BROWN, FLOYD E. 1217 Fannie Ave., Wichita, Kan.
D. V. M., Kansas City Veterinary College, 1917
Vouchers: E. F. Cary and C. W. Barnhart.

BUNN, THURMAN L. Iroquois, S. Dak.
D. V. M., Chicago Veterinary College, 1917
Vouchers: M. M. Davis and C. H. Hays.

CAMPBELL, JAMES H. De Witt, Mich.
D. V. M., Michigan State College, 1931
Vouchers: E. T. Hallman and B. J. Killham.

COX, CAPT. HERBERT M. Fort Davis, C. Z.
D. V. M., Cornell University, 1924
Vouchers: Maj. Arthur D. Martin and Col. Robert J. Foster.

FRETZ, DARWIN S. 306 N. Grove St., Lock Haven, Pa.
V. M. D., University of Pennsylvania, 1932
Vouchers: E. P. Althouse and Martin L. Hutchins.

GOODMAN, LLOYD J. D. Norton, Kan.
D. V. M., Kansas City Veterinary College, 1912
Vouchers: W. R. Barnard and R. F. Coffey.

GOODMAN, RICHARD A. 303 U. S. Barge Office Bldg., New York, N. Y.
D. V. M., Texas A. and M. College, 1932
Vouchers: N. F. Williams and Samuel H. Johnston.

HALL, CUSHMAN C. 3251 Leavenworth St., Omaha, Nebr.
M. D. C., Chicago Veterinary College, 1906
Vouchers: J. N. McIlnay and J. D. Ray.

HARVEY, ERNEST L. Geddes, S. Dak.
D. V. M., Iowa State College, 1919
Vouchers: M. M. Davis and C. H. Hays.

HEEMSTRA, LOUIS C. Lake City, Fla.
D. V. M., Iowa State College, 1932
Vouchers: T. W. Cole and E. L. Reed.

HICKMAN, HARRY B. Malta Bend, Mo.
D. V. M., Kansas State College, 1920
Vouchers: Ashe Lockhart and S. W. Haigler.

HUSSEY, FRANK J. Wagner, S. Dak.
D. V. M., Chicago Veterinary College, 1918
Vouchers: M. M. Davis and C. H. Hays.

KERNOHAN, EDWARD 1444 Fairview Ave., Wichita, Kan.
D. V. M., Kansas State College, 1914
Vouchers: E. F. Cary and C. W. Barnhart.

KNEUP, FREDERICK G. 4331 Pitts Ave., Cincinnati, Ohio
D. V. M., Cincinnati Veterinary College, 1917
Vouchers: G. W. Famous and F. R. Butz.

LAFAYETTE, WALTER W. 620 S. Estelle St., Wichita, Kan.
D. V. M., Colorado State College, 1920
Vouchers: E. F. Cary and O. Emmitt.

LARSEN, ALBERT S. 708 E. Ocean Ave., Lompoc, Calif.
D. V. S., San Francisco Veterinary College, 1911
Vouchers: W. L. Curtis and John L. Tyler.

MCKINNEY, EDWARD D. 601 North 16th St., Milwaukee, Wis.
V. M. D., University of Pennsylvania, 1930
Vouchers: Cecil Houston and B. C. Johnson.

MATKIN, RAY Rockport, Mo.
D. V. M., Kansas City Veterinary College, 1914
Vouchers: Ashe Lockhart and H. W. Young.

MAYER, NELSON J. Mitchell, S. Dak.
M. D. C., Chicago Veterinary College, 1908
Vouchers: M. M. Davis and C. H. Hays.

MELVIN, JOE D. 347 N. Hillside Ave., Wichita, Kan.
D. V. M., United States College of Veterinary Surgeons, 1920
Vouchers: E. F. Cary and J. F. Pickett.

MIKEL, CHESTER J. 334 Federal Bldg., Oklahoma City, Okla.
D. V. M., Colorado State College, 1934
Vouchers: T. F. Dunham and E. Peterson.

NEWMAN, LEONARD L. State College of Washington, Pullman, Wash.
B. S., D. V. M., State College of Washington, 1934
Vouchers: C. E. Sawyer and A. C. Jerstad.

PERRY, JOHN K. 2905 El Camino Real, San Mateo, Calif.
D. V. M., University of Georgia, 1929
Vouchers: W. L. Curtis and John L. Tyler.

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REYES, PEDRO V. Badoc, Ilocos Norte, P. I.
D. V. M., University of the Philippines, 1933
Vouchers: V. Buencamino and Vicente Ferriols.

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D. V. M., Ohio State University, 1934
Vouchers: C. L. Campbell and A. E. Bott.

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Vouchers: Harry Aronson and I. M. Moulthrop.

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V. M. D., University of Pennsylvania, 1922
Vouchers: W. M. Mohler and John R. Mohler.

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D. V. S., Kansas City Veterinary College, 1911
Vouchers: A. T. Kinsley and H. Preston Hoskins.

Applications Pending

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(See July, 1935, JOURNAL)

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Bowman, Walter W., Frederick, Okla.
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Chase, Charles H., Jr., 218 Bettlewood Ave., Oaklyn, N. J.
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Smith, Claude A., R. 3, Fayette, Ohio.
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The amount which should accompany an application filed this month is $7.08 which covers membership fee and dues to January 1, 1936, including subscription to the JOURNAL.

SECTION OF VETERINARY EXHIBIT AT CALIFORNIA PACIFIC INTERNATIONAL EXPOSITION

COMING VETERINARY MEETINGS

Michigan State Veterinary Medical Association. Blaney Park, Blaney, Mich. August 1-2, 1935. Dr. E. K. Sales, Secretary, 535 Forest St., East Lansing, Mich.

Poultry Science Association. University of New Hampshire, Durham, N. H. August 6-9, 1935. Prof. T. B. Charles, President.

Connecticut Veterinary Medical Association. Bridgeport, Conn. August 7, 1935. Dr. Edwin Laitinen, Secretary, 993 N. Main St., West Hartford, Conn.

Saint Louis District Veterinary Medical Association. Melbourne Hotel, Saint Louis, Mo. August 7, 1935. Dr. Harley B. Wood, Secretary, 2754 Meramec St., Saint Louis, Mo.

Tulsa County Veterinary Association. Tulsa, Okla. August 8, 1935. Dr. J. M. Higgins, Secretary, 3305 E. 11th St., Tulsa, Okla.

Ak-Sar-Ben Veterinary Medical Association. Elks Building, Omaha, Nebr. August 12, 1935. Dr. J. N. McIlnay, Secretary, 3251 Leavenworth St., Omaha, Nebr.

Hudson Valley Veterinary Medical Society. Playland, Rye, N. Y. August 13, 1935. Dr. J. G. Wills, Secretary, Box 751, Albany, N. Y.

San Diego County Veterinary Medical Association. San Diego, Calif. August 13, 1935. Dr. L. K. Knighton, Secretary, 3438 Mountain View, San Diego, Calif.

Kansas City Veterinary Association. Baltimore Hotel, Kansas City, Mo. August 20, 1935. Dr. C. C. Foulk, Secretary, 1103 E. 47th St., Kansas City, Mo.

Southern California Veterinary Medical Association. Chamber of Commerce Bldg., Los Angeles, Calif. August 21, 1935. Dr. T. G. Beard, Secretary, 3684 Beverly Blvd., Los Angeles, Calif.

American Animal Hospital Association. Skirvin Hotel, Oklahoma City, Okla. August 27, 1935. Dr. D. A. Eastman, Secretary, 901—19th St., Moline, Ill.

Oklahoma Veterinary Medical Association. Skirvin Hotel, Oklahoma City, Okla. August 28, 1935. Dr. C. H. Fauks, Secretary, 1719 S. W. 15th St., Oklahoma City, Okla.

American Veterinary Medical Association. Skirvin Hotel, Oklahoma City, Okla. August 27-30, 1935. Dr. H. Preston Hoskins, 221 N. La Salle St., Chicago, Ill.

BANG'S DISEASE INFECTION TRANSMITTED TO A DAIRY HERD BY HORSES*

By GEORGE C. WHITE, *Storrs, Conn.*
Storrs Agricultural Experiment Station, and
PAUL P. SWETT, *Hartford, Conn.*

During very recent years, convincing evidence of the infection of horses with *Brucella abortus* of bovine origin has been brought to light. Contributions on the subject provide incontrovertible evidence to this effect.

McNutt and Murray[1] observed an aborting mare on an Iowa farm in which several cows and a few sows had aborted. *Br. abortus* was isolated from the premature foal. The serum of the aborting mare agglutinated antigens prepared from *Br. arbortus* of bovine, caprine and porcine origin, but it failed to react to an antigen of *Salmonella abortivo-equinus.* Rinjard and Hilger[2] furnished evidence that *Br. abortus* is sometimes the causative agent of suppurative lesions of the equine. In 13 out of 15 horses affected with fistulous withers and poll-evil, positive agglutinations occurred at dilutions of 1:100 to 1:1,000. Fitch, Delez and Boyd[3] furnished some evidence of the association of *Br. abortus* Bang in suppurative processes of horses.

Van der Hoeden[4] made serum tests on 424 horses, in which about 20 per cent of the cases reacted in dilutions at 1:100 and above. Nineteen animals with fistulous lesions gave positive reactions in titres exceeding 1:100 in all except one case. Eight of 12 samples of pus yielded *Br. abortus,* some in pure culture. Again, in 1931, Van der Hoeden[5] reported that 14 of 15 horses with neck or throat abscesses and two of six horses with abscesses of the sternum gave positive serum reactions to *Br. abortus,* as did all of 33 horses suffering from fistulous withers. All strains cultivated were of the bovine type.

Plastridge and McAlpine,[6] in studying strains from different isolations, reported that of four strains of equine origin all were of the bovine type. Bennets and Filmer[7] reported that the serum from a horse affected with chronic fistulous withers and another affected with a bursitis on the withers and an enlarged bursa on the poll gave positive reactions to a standard antigen of *Br. abortus* of bovine origin in dilutions of 1:100 and 1:2,000, respectively. Again, in reporting on the identification of strains of different origins, Plastridge and McAlpine[8] found four strains of equine origin to be of the bovine type.

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Hultén[9] injected into guinea pigs material isolated from the fistulous withers of a horse. Four weeks later, two pigs reacted positively, while one failed to react. The horse was stabled with an infected cattle herd on an island in a large lake, this being the only farm on the island. Biejers[10] observed that horses infected with *Br. abortus* suffer from lassitude and a continuous fever. The agglutination reaction (1:12,000) was strongly positive and a positive ophthalmic reaction to a Brucella preparation was observed. Van der Hoeden[11] reported that agglutination reactions of the sera of 50 of 67 horses affected with abscesses of the head, neck and shoulders were positive with titres of 1:400 and above. The pus from 30 of 48 horses contained *Br.* abortus. Three horses fed cultures of *Br. abortus* showed a rise in temperature on the third day and the organism was recovered from the blood six days later, at which time agglutinins were present.

Schoop[12] reported that the sera of three of six horses with fistulous withers and three cases with poll-evil reacted to *Br. abortus* antigen in dilutions of 1:200 to 1:2,000. Magnusson [13] found four cases of *Br. abortus* infection in horses with fistulous withers, from two of which the organism was isolated in pure culture. He points out that horses can be infected readily *via* the conjunctiva, so that positive agglutination tests are obtained, but in nine cases so infected no definite localized lesion was induced. He considers the presence of *Br. abortus* in lesions of fistulous withers to be secondary to an already established bursitis arising from some other cause.

Fitch, Bishop and Boyd[14] report that agglutinins for *Br. abortus*, in a titre of 1:100 or above, have been found in 76 per cent of blood coming from horses affected with fistula and poll-evil. Seven cultures of *Br. abortus* have been isolated from pus, this being 22 per cent of the samples examined for this organism. Horses have been observed to maintain a constant titre of 1:100 or above over a period of two years, and show no evidence of disease. It has been impossible to produce fistula and poll-evil by inoculation except when the organism is injected directly into the neck ligament. Titres as high as 1:21,000 were found in the blood of equines.

Duff[15] reports that he secured a pure culture of an organism from a withers abscess that was indistinguishable microscopically, culturally and serologically from *Br. abortus*. The sera and abscess fluid agglutinated various strains of *Br. abortus* up to and including 1:500. Johansson[16] reports 12 cases of so-called undulant fever in horses, all of which were positive to the

agglutination test. These animals during work, without apparent cause, suddenly broke out in a sweat and were subject to attacks of weakness. An elevation of temperature was noted. He noted absence of appetite, emaciation, and heart affection with edema under the neck and abdomen. Rossi[17] pointed out experiences in the German army showing susceptibility of equines to *Br. abortus*.

So far no evidence seems to have been presented to demonstrate a transference of *Br. abortus* infection from equine to bovine. The following account gives circumstantial evidence on this point.

The herd under consideration consisted of 14 head of purebred Jerseys in 1928, when testing was first started. About one-third of the herd reacted positively and these reacting animals were eliminated promptly. As might be expected, occasional reactors cropped up from time to time during the following year and in each instance the reactor was at once removed from the herd. A considerable number of heifer calves were developed nevertheless and by the beginning of 1929 there was still a herd of ten cows, all abortion-free. When this herd remained clean for a year, it was assumed that all foci of infection had been removed.

This state of confident well-being continued when the regular tests throughout the years 1930, 1931 and 1932 disclosed no more positive or suspicious reactors. During this period, no animals whatever were introduced from the outside except for an occasional change of bulls, all of which were negative when taken in and remained so throughout a preliminary two-month quarantine and during their subsequent retention in the herd.

By the beginning of 1933, the herd numbered 15 head in milk, when, on the annual test in March, six reactors were found. Three of these were mature cows and three were bred heifers.

An investigation to determine the reason for this reinfection was at once undertaken. Various possibilities were considered but none of them seemed to explain the situation fully. In the course of the next eight months, five more cows returned positive tests. All reactors were eliminated as they developed.

Finally it occurred to one of us that there was an explanation which merited serious thought. This possibility developed in our minds as follows: During the summer of 1932, one of the best cows developed severe mastitis and she was separated from the herd promptly and placed in a temporary stall in an enclosed shed near the barn. When she calved in November, it was quite

cold, so she was transferred to a box-stall in the horse stable which is a separately partitioned section of the dairy barn with a feed-room on one side and a harness room on the other side of a passageway connecting the dairy and horse barns. After this mature cow was removed from the box-stall, three heifers were put into the same stall because of crowding in the dairy barn. These heifers were turned out in the same yard with the rest of the herd each day. When the first reactors were found, the cow and these three heifers were among the six giving positive tests.

Serum tests with *Br. abortus* antigen on the six horses were made at once and one of them gave a completely positive reaction. Two others were strongly suspicious, two were completely negative, and the other gave a mild but insignificant reading in the 1:25 and 1:50 dilutions. Tests with *S. abortivo-equinus* antigen made simultaneously were negative, except for non-significant grouping in the lower dilutions. Of the two mares, one was strongly suspicious and the other negative.

To reduce the possibility of further infections, the passageway between the horse stable and the cow barn was closed and the horse hay was forked down from a window at the end of the barn. Cows have been kept out of the horse barn, and horses have been kept out of the cow paddocks and pastures. Since then the cows have been tested regularly at monthly or bimonthly intervals and they have remained constantly negative for the past eleven months.

It is a well-known fact that many dairymen and cattle breeders doubt the possibility of establishing and maintaining an abortion-free herd. Much as they would like to have clean herds they feel that it is so difficult a matter that they, as practical men trying to earn a living, cannot undertake it. Perhaps there are simple, easy and inexpensive methods of preventing the many disappointments that have occurred in the past. If, for example, it is true, as seems likely to us, that the horses, as well as the cows must be blood-tested when there is any possibility for them to come into contact directly, then there is at once apparent one means for helping in the solution of this problem. Similarly, the same reasoning should be applied to sheep and to hogs, since it is also well established that these species are subject to infection with *Br. abortus*.

Of course there are now many instances where the disease has been eradicated and herds have remained free thereafter. The Connecticut State College dairy herd, numbering more than 100 head, has remained free from 1925 to the end of 1934.

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Sixth World's Poultry Congress

The program for the Sixth World's Poultry Congress, which will be held in Berlin, Germany, July 31-August 9, 1936, promises to be practical and interesting. A meeting of the executives of the International Poultry Science Association was held recently in Berlin to decide upon the subjects to be discussed at the Congress. In addition to 18 papers that are to be presented at general meetings, there are to be 100 papers spread over the following sections: (1) General, Education and Organization; (2) Physiology and Nutrition; (3) Breeding and Inheritance; (4) Hygiene and Disease; (5) Domestic Problems; (6) Rabbit Breeding. Among lectures to be given to the Section of Hygiene and Disease, there will be contributions on fowl paralyses and their relation to leukosis, enteritis of fowls with reference to food poisoning, and parasitic diseases.

Second thoughts are ever wiser.—EURIPIDES.

THE PHYSIOLOGY OF THE CECUM OF THE DOMESTIC FOWL*

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The physiologic significance of the cecum of the domestic fowl is not yet entirely understood. Many observations have been made by previous workers but without complete elucidation of the function of this pair organ.

The data comprising the basis of this report consist of observations of the pH of the digestive tract of the chicken, with particular reference to the pH of the cecum as compared to the pH of the rest of the gastro-intestinal tract. The effects of various diets on pH values were studied. Observations were made also of the time required for the filling and emptying of the ceca.

It seemed to us worthwhile to consider some of the physiologic aspects of the ceca, as reported in the literature, which, while not directly concerned with the data presented, are nevertheless of considerable interest.

REVIEW OF LITERATURE

The fact has been long established that the ceca are not essential to life of the fowl, as these portions of the intestinal tract may be removed or occluded with no apparent ill effects.[1-3]

There is considerable variation in the form of the cecum in birds. An excellent study in comparative morphology has been made by Maumus,[1] who distinguished four general types: (1) a type in which the ceca were well developed; (2) a type in which the ceca were rudimentary; (3) a type in which there was only one cecum, and (4) a type in which there was no cecum at all. An interesting observation of Maumus is that most birds which have rudimentary ceca are carnivorous and that most which have developed ceca are vegetarians. This is a general rule to which, of course, there are exceptions.

The ceca of the domestic chicken (*Gallus domesticus*) are two comparatively long tubes (usually 15 to 17 cm in length) which open into the intestinal tract near its termination. Each cecum is joined to the small intestine by a short ligament of peritoneum which extends from the origin of the cecum to its blind end. The proximal portion of the cecum is usually constricted and the

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blind portion is dilated. Near the orifice of the cecum are masses of lymphoid tissue of variable size. These masses are situated in and under the mucosa, and are similar to the pharyngeal tonsil of mammals.

Calhoun's observations[4] on the microscopic anatomy of the cecum are briefly as follows: The lining epithelium is columnar and contains goblet cells. The length of the villi of the mucous membrane varies in different portions of the ceca. The muscularis mucosa is absent in certain places. The submucosa is composed of white fibrous and yellow elastic tissue and contains nerves, blood-vessels, and lymphatic plexuses. The *lamina muscularis* varies in thickness and arrangement. The serosa is rich in nervous elements.

Maumus and Launoy[5] and Maumus[1] made cecal fistulas in the duck and goose and studied the action of the cecal juice thus obtained on different digestible materials. They concluded that there was a hydrolyzing ferment, which attacks starch, and an invertase of saccharose in the cecal juice. They were of the opinion that there was also present a proteolytic enzyme which was somewhat similar to trypsin in man. No action of the cecal juice on fats could be demonstrated. Maumus, in one interesting experiment, for a time gave a chicken an exclusively carnivorous diet. He observed that starches were not hydrolyzed with cecal juice from this chicken, but that protein materials were digested about twice as fast as had been noted in previous experiments with cecal juices obtained from other chickens on regular diets.

Röseler,[6] by making determinations of total nitrogen and pure protein, found that with all types of feeding the cecal feces have a higher percentage of total nitrogen in the form of pure protein than do intestinal feces, and hence he concluded that there is absorption in the cecum of nonprotein nitrogen substances (so-called amides).

Radeff[7] determined the coefficient of crude fiber digestion both in normal and in cecectomized fowl. Neither the normal nor the cecectomized fowl evidenced digestion of the crude fiber of barley. The normal fowl was found to have a digestion coefficient of 4.58 to 5.71 per cent of the crude fiber of wheat, and the cecectomized fowl only 1.42 per cent. A larger difference was shown in the case of the crude fiber of corn, in which normal fowl gave a coefficient of 17.1 per cent and cecectomized fowl nothing. Röseler[6] substantiated the fact that crude fiber is split in the cecum. He found that, in the case of chickens fed on barley, the crude fiber content of the cecal feces and intestinal feces was the same. However, with other types of grain, the fiber of which is partially

digested by the chicken, the crude fiber content of the cecal feces was always lower.

Little is definitely known concerning the physiologic mechanics of the filling and emptying of the cecum of the fowl. Browne[8] maintained that the peristaltic activity of the cecum, by exerting a sucking action, is responsible for the filling of the organ. Voltz[9] also expressed this opinion. Browne observed that when the cecum was stimulated by pricking, a small wave of contraction would proceed toward the blind end and be followed by a larger wave which traveled toward the intestine. Browne studied the filling of the cecum of chickens by feeding them dye-marked materials and killing the chickens shortly afterward. He stated that only fluids may enter the cecum and that their entrance into the cecum is dependent on the dilution and quantity of such fluids. According to Browne, the time necessary for the material to reach the blind end of the cecum, when given by mouth, was from one and one-half to three and one-half hours or longer.

Röseler,[6] observing the differences in characteristics of the cecal and intestinal content, studied the droppings and distinguished between cecal feces and intestinal feces. From these studies he concluded that the ceca empty themselves every 24 to 48 hours, there being 7.3 to 11.5 intestinal emptying to one cecal emptying, and also that one cecum apparently emptied at a time. Röseler also estimated the proportion of cecal to intestinal feces, and found that it varied with the type of feed. The ratio with barley was found to be 1:6.6, with corn 1:13.7, and with wheat 1:16.68. Röseler further observed that, after ablation of the ceca, the percentage of dry substance in the feces was considerably less than that observed in the feces of non-cecectomized chickens, from which he concluded that the ceca have an important functional rôle in the resorption of fluid.

Several workers have made observations on the pH of the gastro-intestinal tract of the fowl. Beach[10] made rather extensive studies on the effect of feeding cultures of *Bacillus acidophilus*, lactose, dry skim milk, or whole milk on the hydrogen-ion concentration of the ceca of chickens. He found that the pH of the cecum was changed from a normal range of 6.0 to 7.4 to a range of 4.4 to 5.6 by feeding sufficient amounts of the various materials. Beach found a narrow normal range of pH, from 6.2 to 6.6, of the duodenal contents in six normal fowl. The change in pH of the cecum could be produced within two or two and one-half hours after a single feeding of a milk product. The return to normal pH in the cecum would occur within eight to 24 hours after feeding. A "spot plate" method, utilizing various dye in-

dicators and a series of standard buffer solutions, was used by Beach in the titration of the pH of the samples of the contents of the alimentary canal.

Ashcraft[11] observed the change in pH of the intestinal contents of fowls on various diets containing milk products after a feeding period of two weeks. The control ration, a diet containing 20 per cent meat products, yielded the following normal pH values: duodenum 5.69, ileum 7.13, cecum 7.06, and large intestine 7.26. The other rations were made up with the following milk products: dried buttermilk, Kraco (a commercial dried whey), dried skim milk, and lactose. He found that these rations slightly lowered the pH of the contents of the upper portion of the intestinal tract, but produced a more significant decrease of the pH in the cecum. He also noted that, with the feeding of milk products in the concentrations used, the cecal contents were markedly altered from their normal appearance to a "yellow, creamy, frothy mass," and he noted further that the size of the cecum was increased several times.

Mussehl, Blick, and Ackerson[12] fed chickens on variable diets and observed the pH of the gastro-intestinal tract. They found no marked differences in pH values in the various portions of the digestive tract between the groups of chickens fed the various diets (table I). McLaughlin[13] observed the pH values of the gastro-intestinal tract of chickens which were kept on a grain ration (table I). In both studies observations were made by the quinhydrone gold electrode method.

TABLE I—*pH of the alimentary canal of the domestic chicken.*

ORGAN	MUSSEHL, BLICK, AND ACKERSON (116 CHICKENS)	MCLAUGHLIN (8 CHICKENS)	OLSON AND MANN PRESENT STUDY OF 42 CHICKENS (310 READINGS)		
			MEAN	LOW	HIGH
Crop	.....	.....	5.37	4.00	6.37
Proventriculus	5.32	5.59	4.69	3.07	6.09
Gizzard	3.04	3.39	4.06	3.05	5.02
Duodenum	6.17	6.295	6.31	5.64	7.10
Jejunum	6.40	6.295	7.04	6.12	8.01
Ileum	7.03	.....	7.59	6.93	8.42
Right cecum	6.50*	1.917	7.08	5.83	8.20
Left cecum			7.12	5.93	8.16
Rectum	6.60†	.....	7.38	6.29	8.18
Coprodeum	.....	.....	7.24	5.69	8.10

*Mean pH of 20 chickens.
†Mean pH of 10 chickens.

METHODS

Seventy-five chickens were used in this study, all of which were adult. Forty-two of them were used in the studies on hydrogen-ion concentration.

The hydrogen-ion concentrations of samples of gastro-intestinal contents were determined by the quinhydrone gold electrode technic. The samples were obtained from the following organs: crop, proventriculus, gizzard, duodenum (immediately distal to its attachment to the pancreas), jejunum (in the region of the remnant of the yolk stalk), ileum (a few centimenters anterior to its termination), right and left cecum (at about the anterior third), rectum (immediately distal to the cecal orifices), and coprodeum, or anterior portion of the cloaca. The samples varied in the amount collected, depending on the source. The proventriculus did not yield a sample in all cases and when obtained it was small; in a few cases the sample was obtained by scraping the surface of the mucosa with the lip of the test-tube. Nearly all samples required the addition of a small amount of triple-distilled water to render them fluid enough to pour into the glass chamber of the instrument. Three hundred and ten samples were obtained from forty-two chickens. In some cases samples were taken from only the two ceca and from the adjacent intestine.

The diets fed the experiment chickens consisted of a standard ration for chickens, equal parts of cracked corn and wheat, and a standard ration with 10 per cent dried buttermilk. The diets were fed, in most instances, after a preliminary fasting period of 18 or 20 hours. The use of water was not restricted. The chickens were killed after being on the various diets for periods ranging from a few hours to 14 days. Food was kept before the chickens from the time of the initiation of the feeding period until they were killed.

In the study of the rate of filling and emptying of the ceca, various substances were mixed with the food to serve as markers. The diets used were similar to those just described. The substances used to mark the food were lamp black, hydrokollog, carmine, rose bengal, and trypan blue. These were fed for varying intervals after a previous fasting period of 18 to 20 hours. The use of water was not restricted. In studies on the emptying time of the cecum, a food with a dye marker of either rose bengal or carmine was fed for 24 or 48 hours, and the same food was then supplied without the dye. The chickens were then killed at varying intervals after institution of the second feeding period.

RESULTS AND COMMENT

There was no demonstrable difference in the pH of the various portions of the intestinal tract as a result of feeding the chickens different foods. These observations are similar to those of Mussehl, Blick, and Ackerson.[12] It is probable, however, that a more radical change of diet over a longer period of time might have had an effect on the pH values. The observations are presented as one group, since the type of diet apparently had little effect on the pH. The mean values of pH are given in table I. These results are in accordance with those of Mussehl and others, and with one exception with those of McLaughlin also.[13] This exception is in the pH ascribed to the cecum by McLaughlin as 1.917. In no instance was such a low value obtained in this work (table I).* It is evident that the ingesta are decidedly acid in the crop, and become more so in their passage through the proventriculus or glandular stomach. This acidity is maintained in the gizzard but becomes rapidly neutralized in the small intestine. An interesting fact is that the reaction in the cecum is more acid than in either the preceding or succeeding portions of the intestinal tract. This may suggest that a different type of secretion is produced by the glands of the cecal mucosa.

The work on observations of the filling of the ceca was begun with the use of lamp black as the agent to mark the food. The results of preliminary studies were very disappointing, as there was no evidence that lamp black was present in the ceca after feeding the marked diet over a considerable period. Eighteen chickens were given food marked with lamp black. These chickens were killed in groups of two at the following intervals: 15 minutes, 30 minutes, 75 minutes, 90 minutes, five hours, and six hours; three were killed after 24 hours and one after 48 hours of feeding. The ceca of two chickens examined after feeding five hours and of one chicken examined after feeding six hours showed a very slight amount of lamp black; the concentration of lamp black in the ceca of these three chickens, however, was not equal to that in the rest of the intestinal tract. The ceca of all of the other chickens did not give any gross evidence of the presence of lamp black. It appeared, therefore, that lamp black mixed with the food would not find its way into the ceca in demonstrable amounts. To sustain this viewpoint further, three chickens were given food marked with lamp black for 14 days;

*Since this was written, R. L. Mayhew[14] reported that the acidity of the posterior portion of the intestinal tract was higher in chickens ten to eleven weeks old than in older chickens. The pH of the various portions of the intestinal tract of adult fowls was in keeping with those observed in this study.

two of them had a very slight amount of lamp black in the ceca, and in the other lamp black was not detectable by gross examination.

The water-soluble dye, carmine, was then resorted to as a food marker. Fifteen chickens were fed a diet to which carmine had been added. In one case in which the chicken was fed the diet for two and one-half hours, the presence of the dye was detectable in the ceca, although the amount of the dye was small. Two chickens which were fed for two and one-half and three hours, respectively, gave no evidence of the dye in the ceca. Three of five chickens fed the diet for 24 hours showed the dye in the ceca to the same degree as in the rest of the alimentary canal; in the ceca of one chicken only a trace of the dye was present and in the ceca of another no dye was detectable. All of the chickens which were fed over periods ranging from 72 hours to ten days gave evidence that the dye marker was present in the ceca to the same degree as in the rest of the intestine.

It became evident that carmine, when mixed with the food, would appear in the ceca in the majority of instances after a 24-hour period of feeding and was constantly present after feeding periods of 72 hours or more. This characteristic was not possessed by lamp black.

Colloidal carbon, in the form of hydrokollog, was then employed in marking the food. Four chickens were utilized, two of which were examined after 24 hours of feeding and two after 48 hours. One chicken which was examined after the feeding period of 24 hours had a greenish-black discoloration of the cecal content that rendered detection of the black carbon somewhat difficult. Three chickens distinctly showed the presence of the marker in the ceca.

Several chickens were studied in a similar manner, using rose bengal and trypan blue as markers. The feeding periods necessary to fill the ceca with these dyes were similar to those required by carmine and hydrokollog.

The next procedure in the study of the filling of the ceca was the use of two dye markers in the same feed. Rose bengal and trypan blue were mixed in the diet and fed to two chickens. The ceca were examined after 24 and 72 hours, respectively, of feeding. In each case the presence of both dyes was apparent in the ceca. Two other chickens were fed a diet in which rose bengal and lamp black were mixed in the food. The ceca were examined after three and four days, respectively, of feeding, at which times only red staining of the material by rose bengal was apparent. The cecal contents of the chicken fed for four days were

examined microscopically, by which means some carbon particles were demonstrable.

It is evident from the foregoing data that particles of carbon in the form of lamp black do not gain entrance to the ceca of fowls in any appreciable amount, even after long periods of feeding. Carbon, when given in the form of hydrokollog, may find its way into the ceca after a feeding period of 24 to 48 hours. Rose bengal, carmine, and trypan blue, all water-soluble dyes, are demonstrable in the ceca in most instances after a feeding period of 24 to 48 hours.

These observations on the filling of the ceca are somewhat at variance with the findings of Browne,[8] who observed that a solution of methylene blue, introduced forcibly into the crop, was present in the ceca one and one-half hours later, and that methylene blue or fuchsin, added to semisolid dough and given in the same manner, was found in the ceca three and one-half hours later. It was found in this work that the rate of passage of the marked food through the alimentary canal varied somewhat, but that in general it had reached the terminal portion of the tract one and one-half to three hours after the beginning of the feeding period, or at an interval similar to that within which Browne observed the material in the ceca. The different method of introducing the material which was followed by Browne must be borne in mind.

Browne's view that only fluids may enter the ceca would appear to be tenable in light of the fact that water-soluble dyes readily gain entrance, whereas insoluble lamp black does not. Carbon, in the form of hydrokollog, however, is able to gain entrance to the ceca. Meyer[15] described, in his microscopic observations of cecal contents, the presence of grain husks. The physical state may be one of the factors determining the substances which may enter the cecum.

The emptying time of the cecum was studied by successive feeding of a dye-marked food and one that was not marked. Sixteen chickens were used in this study. The presence or absence of the dye in the cecum was determined by observations made 24, 31, 48, 96, and 120 hours after cessation of the first feeding period. It was found that the concentration of dye did not appear to diminish until 48 hours after the feeding of the dye was stopped. Ninety-six hours after administration of the dye was stopped, two of four chickens in the series still had an appreciable amount of dye in their ceca. Three chickens, observed 120 hours after the termination of the period of dye feeding, gave

no evidence of dye being present in the ceca. Evidently, then, the ceca may completely evacuate themselves in 120 hours.

SUMMARY

Observations on the pH of the alimentary canal of 42 chickens have been made. The pH values of the cecum were observed to be lower than those of either the preceding or succeeding portions of the intestine.

The studies on the filling of the cecum indicated that the dyes, carmine, rose bengal, and trypan blue, and hydrokollog, mixed with a dry feed, could be detected in the cecum 24 to 48 hours after being fed. Lamp black, when mixed with the feed, did not gain entrance to the cecum in any appreciable amount even when fed for a period of two weeks.

The ceca were found to empty themselves of carmine and rose bengal, which entered the ceca after having been ingested with the feed, 120 hours after cessation of feeding of the dyes.

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In the Middle Ages, pork was known as "the poor man's food," because almost any man could raise a pig, while only the wealthy had grazing lands for cattle.

SURGICAL AND MEDICAL PROCEDURE IN THE TREATMENT OF DISEASES OF THE UVEA IN VETERINARY PRACTICE*

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Anatomically the uvea is divided into three parts. The anterior and smallest surrounds and regulates the pupil, the middle and thickest supplies muscles to stretch the choroid and changes the convexity of the crystalline lens, and the posterior and largest, reaching from the equatorial region of the eye to the optic nerve entrance, contains blood-vessels. These three parts are: the iris, the ciliary body and the choroid.

Diseases of the Iris

CONGENITAL ANOMALIES

Coloboma: This develops from faulty closure of the fetal fissure. The iris is not continuous and consequently the pupil has an anomalous shape. Coloboma of the iris may occur without other congenital anomalies but it is usually associated with colobomas of the ciliary body, choroid and, less frequently, with coloboma and subluxation of the lens. It is usually situated inferiorly and somewhat internally, rarely in other directions. It may be total or partial, single or multiple. It may be triangular, quadrangular, slit-like, bean- or kernel-shaped. If other eye defects do not interfere with the vision, the remaining iris tissue reacts to light and drugs.

Aniridia: Complete absence of the iris. Irideremia is used as either a synonym for aniridia or for designating partial circular maldevelopment of the iris.

Albinism: Absence of pigment in the stroma cells of the *stratum vasculosum* and in the modified pigment layer of the retinal part of the iris. The granula of the iris and the ciliary body always remain pigmented. The retina and choroid are usually involved. It is hereditary and consanguinity may be responsible for it. It may be monocular. The diagnosis is not difficult. The visual power of the animal is limited. Inspection discloses a very sparsely colored iris. The fundus reflex is pink. In cats and dogs deafness is frequently allied with albinism.

Heterochromia: The color-difference of the two irides. Monocular heterochromia is a marked sector-shaped pigmentation in

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one iris. Very well-marked pigmentation of a circumscript, slightly elevated spot is melanosis, which should be watched for a possible tendency to grow, as it must be differentiated from melanosarcoma. Heterochromia occurs in the cat, dog and goat. It may be allied with uveitis and glaucoma. It is a degenerative sign.

Hyperplasia of the granules may occur, necessitating ablation.

Persistent pupillary membrane: A total or partial remnant of the capsulo-pupillary membrane, which totally or partially obliterates the pupil. When it is very marked, operative removal may be indicated. In younger animals postpartum absorption was seen by Meyer in a 9-month-old calf and by Youatt in a 6-month-old dog. Schleich claims that in domestic carnivores it is usually present after birth, but becomes absorbed shortly thereafter.

Polycoria is a multiplicity of the pupil. It may lead to monocular diplopia.

Acquired Diseases

Inflammations: Iritis may occur primarily or secondarily, due to endogenous or exogenous causes. Its development may be acute, chronic or recurrent and it may or may not be associated with cyclitis or choroiditis. Its symptomatology varies in the several stages of its progress. In the stage of hyperemia, the systemtic symptoms of fever, loss of appetite and weight will be noted. On the visual organ edematous lids, chemosis, ciliary injection, tenderness, lacrimation and photophobia will be observed. In this stage the pupil is miotic and the pupillary reflexes are delayed. The color of the iris is dull and its design of structure loses definition. The lacunae, contraction rings, sphincter-ruffle and other structures will not be seen with such plasticity as in an unaffected iris. (It is always necessary to compare the two eyes.) The intraocular tension is usually reduced.

Occasionally blood escapes from the congested arterioles and hyphemia develops. In the stage of exudation, exudate develops first in the iris-stroma, then adhesions or synechiae form between the pupillary margin of the iris and either the anterior lens capsule or posterior surface of the cornea and finally exudate may pour into the anterior chamber. If the exudate is sero-fibrinous, deposits of grayish fibrin masses will be seen on the posterior surface of the cornea, when examined with the lupe and focal illumination. If it is fibrino-purulent, hypopyon develops in the lower sector of the anterior chamber. In this stage either secondary glaucoma or hypotension may develop but the tension will remain normal in successfully managed cases.

In the stage of resorption these signs and symptoms gradually disappear and total restitution of normal anatomical and physiological conditions may take place in milder cases. In more severe and recurrent cases some of the deposits organize, and a few synechiae will connect the iris with the anterior lens capsule. The pupil may become occluded and the several parts of the posterior chamber may become secluded from each other. Both of these conditions may interfere with the circulation of the aqueous humor, which may balloon the iris forward and cause "iris bombé." The iris may atrophy; in the deep layers of the cornea and the lens opacities may develop; the latter may be pushed forward or subluxated by the stagnating aqueous humor and by organized exudate masses.

Finally atrophy of the entire ocular globe may develop. Panophthalmia may develop if purulent iritis is associated with purulent cyclochoroiditis. Clinically the following forms are observed: (1) acute exudative, (2) subacute, (3) parenchymatous and (4) nodular. Nodular iritis in domestic animals is due frequently to tuberculosis. The node is a minute single tubercle or the confluence of several small tubercles. Occasionally a tuberculoma will be seen. The fate of a tubercular nodule here, as elsewhere in the organism, will be resorption or caseation with ulceration or cicatrization. Relapse and recidivation are frequent in the various iritides of the domestic animals.

Etiologically the following factors have been noted:

(1) Trypanosomes and piroplasms.

(2) *Sporotrichum beurmanni,* which causes nodular iritis in the dog and cat. The sporothrix does not cause iritis; experimentally only mild inflammation has been produced.

(3) Tuberculous infection is spontaneous in the cow, pig and cat. Lottermoser found tuberculous uveitis in a 7-month-old bovine fetus. In other animals experimental tuberculous iritis has been produced. It would seem very desirable to conduct statistical investigations for determining the incidence of tuberculous eye disease in apparently healthy, and incipient and advanced tuberculous domestic animals. Menleiter, in 1905, did some work in this field and he has found that a high percentage of his material had ocular manifestations. However, he selected only advanced cases of pigs, wherefore his figures cannot be accepted for all groups and species.

(4) Glanders will cause severe nodular iritis and cyclitis.

(5) Experimentally the following microörganisms were found to cause iritis: (a) *Bacillus abortus* (Bang), (b) *Micrococcus melitensis* (both cause nodular iritis), (c) *Bacillus pyocyaneus,*

(d) *Staphylococcus aureus* (both cause miliary abscesses), (e) *Pasteurella aviseptica* and (f) the virus of peripneumonia (both cause exudative iritis).

(6) The rabies of hares causes hemorrhagic iridocyclitis and hyalin degeneration of Harder's gland.

(7) Metastatic iritis may develop in equides: (a) in sporadic and epizoötic pleuro-pneumonia about 0.5 per cent ocular morbidity is noted with permanent ocular damage in 0.1 per cent of all cases; (b) in glandular disease 3 per cent of all cases may be expected to suffer ocular symptoms; of this number 75 per cent have involvement of both eyes; (c) in influenza; (d) in petechial disease of the horse; (e) in foot-and-mouth disease; (f) in septicemia; (g) in hematogenous miliary tuberculosis of the dog, cat, pig and cow; (h) in contagious agalactic mastitis of the sheep and goat.

(8) Focal infections are important in the dog (abscessed teeth) and in the cow (mastitis).

(9) A diphtheroid bacillus in domestic fowl produces iritis.

(10) Traumatism may cause iritis without the presence of microörganisms.

(11) Under the name of periodic ophthalmia (moonblindness), primary anterior uveitis or plastic exudative recidivant moonblindness of the equides a very important bilateral disease is known. Etiologically several factors have been mentioned: (a) Parasitic infestations (cysticerus, distomas). (b) A malaria-like microörganism was found by Potapenkow, in 1892, which caused iritis in 14 to 40 days in the horse, dog and rabbit when injected intradermally. (c) Cocco-bacilli, *Bacillus coli, Staphylococcus pyogenes aureus, citreus* and *albus*, the nerve bacillus of horse (proven by passage from horse to rabbit in 1919). (d) Rosenow, in 1927, found that *Flavobacterium ophthalmiae* is associated with a diplococcus in the exudate of the anterior chamber and on contaminated fodder. He prepared cultures from both sources and has been able to produce uveitis by injecting subcutaneously either one or both of the cultures into experiment animals. Exogeneous or transcorneal infection has not been proven. Improper stabling, insufficient food, excessive work, or unhealthy drinking water may debilitate the animal. Rosenow's experiments seem to prove, however, that this is an endogenous infectious disease and that the port of entry is the digestive tract.

Moonblindness has been of constant interest to the veterinary medical profession, armies, transportation companies and legislatures. Thierry published an interesting report in 1807, in which he stated that in conjunction with an enzoötic of moonblindness

in Strassburg 500 horses became affected out of 3,000. Renaud observed in 1861 an enzoötic in the departments of the Somme, Pas de Calais and Seine Inferieure, and estimated the morbidity as 70 per cent. General Smith observed moonblindness in the British horses in the Transvaal in the course of the Boer War, in 1901-1902. The British horse was similarly affected in France during the World War. The experience of the German and later the French authors in peace and war substantiated these writers. The disease does not seem to be hereditary. Beyer would use stud animals affected with moonblindness, but not with congenital cataract.

The primary iridocyclitis of the cow is essentially similar to moonblindness. It is a fibrino-purulent inflammation. Epizoötic keratitis and secondary iridocyclitis are frequent in cattle. Although the economic value of the animals is greatly reduced in both diseases, hereditary lack of resistance may play a rôle only in the primary iridocylitis; for this reason, too, the differential diagnosis is of importance.

The treatment of iritis is local and systemic. The local treatment consists of the application of 0.5 per cent atropin sulfate solution for full mydriasis; application of heat several times a day; ocular rest and protection from glare or even ordinary illumination. In cases of secondary glaucoma, atropin may be continued, as the increase of intraocular tension develops secondarily, due to congestion and exudation which are relieved by atropin. Surgical remedies for hypopyon, hyphemia and secondary glaucoma are paracentesis of the anterior chamber and iridectomy. These are simple maneuvers, but the danger of infection is great and therefore operations should be avoided, if possible, unless asepsis can be guaranteed during the operation and in the course of healing of the corneo-scleral wound. The treatment directed to the general system of the affected animal will be hygienic, derivative and roborant in the first place. Specific or nonspecific autogenous or commercial vaccines may be of immense benefit. I would recommend experimentation with radioactive energy. The underlying systemic disease should receive commensurate attention.

The prognosis of iritis should be guarded. Permanent visual defect, atrophy of the anterior segment of the eye or globe or panophthalmia may greatly reduce the value of the animal. In exceptional cases evisceration will be done for panophthalmia and enucleation for atrophy of the globe.

Tumors: Tuberculoma and hyaline degeneration have been mentioned under inflammation. The latter disease seems to be limited to the rabbit and its treatment is of course medical. Tu-

berculoma of the iris, however, may be mistaken for neoplasm. Differential points in diagnosis are for tuberculoma: inflammatory symptoms in the stroma, additional tubercles of the iris, exudate in the anterior chamber and signs of tuberculosis elsewhere in the eye and general system. Echinococcus cysts in the anterior chamber are not so infrequent in domestic ruminants as in man. The differential points in diagnosis are: translucency of the tumor, locomotion of the parasites, very acute exudative inflammatory reaction and evidence of parasites elsewhere in the animal body.

The true neoplasms of the iris are cysts of the granula, cysts of the endothelial layer and sarcomas.

It is known that granula are derived from the retinal part of the iris and consist of some stroma covered with one pigmented and one non-pigmented layer of cells derived from the retinal part of the iris. Polypoid and cystic degeneration may occur in the granula. In the horse the granula are very well developed. Larger granular cysts may occlude the pupil. Their removal may be indicated. The technic is simple, but attention should be given to selecting larger instruments for larger eyes. The operation should be performed under general anesthesia and strict asepsis.

Cysts of the iris are rare. The benign tumors give rise to symptoms only infrequently. Their excision, together with the underlying iris, is recommended only if increase of the growth, visual disturbance, anterior uveitis or secondary glaucoma arise.

Sarcoma of the iris and other parts of the uvea is diagnosed rarely. It may be stated, however, that many cases of sarcoma of the orbit are but the result of an unrecognized intraocular neoplasm. The symptomatology of sarcoma varies in the different stages of the development of the neoplasm. In the initial stage a pigmented or non-pigmented tumor appears in the stroma, causing moderate but increasing functional and circulatory disturbance. In the second stage, due to rapid growth of the tumor, these disturbances increase, the anterior chamber will be more or less filled, neighboring ocular strucures will be infiltrated and severe secondary glaucoma develops. In the third stage, the adjacent sclera will be destroyed and the orbit will be invaded. In the final stage, metastases appear at other parts of the organism. Early diagnosis should be made, to save the animal's life by sacrificing the affected globe. If, amidst inflammatory symptoms, a "melanotic spot" of the iris increases rapidly, or if the intraocular tension tends to increase, or if, due to a tumor in the deeper stroma, gradual, slight, partial and backward dislocation of the lens occurs while the anterior aspect of the iris shows lit-

tle, and the depth and regularity of the anterior chamber change, we must think of the possibility of intraocular neoplasm. We should perform the operation before the sclera or the optic nerve or its sheaths are invaded.

Injuries: Perforating injuries may cause prolapse of the iris and sharp or contused, single or multiple, partial or total wounds of the iris. Hyphemia may occur. Foreign bodies may lodge behind, on, or in front of the iris. Indirect, dull traumatism may cause iridodialysis or multiple radiating wounds. The treatment of injuries follows that of iritis. In case of prolapse, the prolapsed portion of the iris should be excised.

Iridodialysis should be discussed at greater length as not only traumatism but other causes, such as tumor of the ciliary body, plastic irido-choroiditis and luxation of the lens, may cause it. The symptoms of dialysis are: a detachment of the iris at one or several points from its limbic and ciliary attachment; irregular shape of the pupil and division into two of the same by the detached iris; irregularity of the anterior chamber and hyphemia. In man, monocular diplopia develops. The treatment of this condition follows that of iritis. Iridectomy or enkleisis (inclosure) of the detached root into the lips of a slight retrolimbal scleral incision should be attempted.

Foreign bodies may be lodged infrequently on the iris, anterior lens capsule or in the anterior chamber. Also parasites have been found: nematodes in the horse, cow, buffalo, camel, dog and turkey; thalazia in cattle; strongylus in the dog; cysticercus on the anterior lens capsule of the cow.

Anomalies of the Pupil

At the examination of the pupils we must have a well-formulated idea of the normal shape of the pupil of the species under observation. It is of importance that the condition of adaptation to stronger or weaker illumination, psychogenetic causes and the age of the animal under examination may influence the size of the pupil. Certain solutions used in medicine and ophthalmology also have miotic or mydriatic effect.

It is to note that alkaloids of the following commoner plants cause bilateral mydriasis, when ingested in quantities: the bittersweet berry and *Datura strammonium* in the horse and cow; *Colchium autumnale* in the horse, cow and pig; digitalis in the domestic fowl; ergot in the sheep and pig.

The shape and size of the two pupils of a normal animal are equal. Slight inequality of size may be due to anisometropia and amblyopia. In case of inequality that pupil will be of normal

size which has normal pupillary reactions. The abnormal pupil may be smaller or larger than the normal.

Abnormal shape of the pupil may be due to: (1) synechiae, which develop in iritis; (2) incomplete paralysis of the sphincter muscle of the pupil.

Abnormal pupillary reactions are caused by diseases of (1) the iris or the nerve supply of the iris, (2) the retina or optic nerve, or (3) certain basal nuclei and paths of the brain.

The diseases of the iris have been described. Paralysis of the sphincter muscle causes mydriasis, stimulation of the oculomotor nerve causes no miosis, its further inhibition is impossible, stimulation of the cervical sympathetic causes mydriasis, and inhibition of the same structure causes no effect. Spasm of the sphincter muscle causes miosis; stimulation of the oculomotor nerve has no further effect, its inhibition causes mydriasis, and stimulation and inhibition of the sympathetic have very slight effect. Paralysis of the dilator muscle causes miosis; stimulation of the oculomotor nerve causes further miosis, its inhibition slight dilation of the pupil, stimulation and further inhibition of the sympathetic are without effect. Spasm of the dilator muscle causes mydriasis, stimulation of the oculomotor causes miosis, its inhibition no increase in mydriasis, further stimulation of the sympathetic is impossible, and its inhibition causes miosis.

The pupil of a blind eye does not react to light directly, and the consensual light reaction of the partner eye will be absent, although it reacts to direct light.

The various diseases of the central nervous system of man have well-known effects on the pupils. This knowledge should not be transferred schematically to animals. Whether the study of organic neurology is of practical importance for the veterinarian, or not, may be questioned, but I believe that this immense field for experimental research should be explored by the scientists, as it must supply us with important observations in comparative pathology.

Diseases of the Ciliary Body

Congenital Anomalies

Coloboma: A rare anomaly, which occurs alone or together with coloboma of the iris and the choroid.

Acquired Diseases

Cyclitis: Inflammation of the ciliary body rarely develops without inflammation of other parts of the uvea. The symptom-

atology of cyclitis is that of a severe iritis. If pain and tenderness are localized on the equatorial region, if there are fresh opacities in the vitreous and aqueous humors do not interfere changes markedly, we must think of cyclitis. The treatment is identical with that of iritis.

Neoplasms: New growths of the ciliary body are rare. The symptoms develop in the sequence described in conjunction with sarcoma of the iris. As the tumor is behind the iris and peripheral from the lens, irregularity of the anterior chamber and dislocation of the lens will be early symptoms. The tumor may cause detachment of the ciliary body, in which case very low intraocular tension precedes the stage of increased intraocular tension. The tumor can be seen with the ophthalmoscope if the opacities in the vitreous and aqueous humors do not interfere with the visibility. Transillumination of the globe helps the diagnosis, which should be early, followed promptly by enucleation.

Injuries: Traumatisms of the ciliary body are more dangerous in man than in domestic animals, because the ciliary body is better developed in man and sympathetic ophthalmia is absent in animals. A foreign body may penetrate into the ciliary body or through the ciliary body into the vitreous chamber. Its removal may be successfully accomplished and, if infection does not set in, good cosmetic and even functional results may be obtained. Equatorial trauma may cause injury of the ciliary body with or without rupture of the sclera. In the latter case the scleral wound may be sutured and covered with conjunctiva. Injury of the ciliary body always causes hemorrhage into the posterior and anterior chambers and inflammatory symptoms. Also detachment of the ciliary body and choroid may develop. The treatment is that of iridocyclitis.

Diseases of the Choroid

Congenital Anomalies

Coloboma: This condition of the choroid may occur alone or together with coloboma of other parts of the uvea. It may be situated inferiorly from the optic papilla or at other parts of the fundus. It may be single or multiple. Its size and shape vary. It may be associated with coloboma of the optic papilla and partial absence of the retina. It is visible only when the pigmented epithelial layer of the retina is absent. The ophthalmoscopic picture consists of a large yellow spot (the interior surface of the sclera) delimited towards the normal fundus by a broad,

fuzzy gray-black margin (retinal pigment). Over it normal retinal blood-vessels may course.

Albinism: The albinotic fundus has a light-red reflex. The pigment being absent from the retina and uvea, the choroidal vessels are visible. The *tapetum lucidum* will show no contrast with the *tapetum nigrum.*

Acquired Diseases

Choroiditis: Rarely diagnosed in veterinary medicine as the animals usually are not permitted to reach more advanced age, as they do not rely so much on their visual faculty and as the attention of the profession is not much centered on functional and anatomical observation of the animal eye. In human medicine the internist, the neurologist and numerous other specialists find that the study of ocular fundi is especially helpful in making current diagnosis and prognosis of extraocular disease. I am bold enough to encourage you to try to correlate your findings on the fundi with your extraocular symptomatology. You will find that cardiovascular, hematological, gastro-intestinal, parasitic infections, neurological and other diseases will cause abundant symptoms in the ocular fundi.

Inflammation of the choroid may be complicated with inflammation of other parts of the uvea, in which case the symptoms of interior uveitis will be more or less marked. In uncomplicated choroiditis there are practically no subjective and external objective symptoms. With the ophthalmoscope, however, important changes of the fundus are visible. In the earlier stages the pigmented epithelial layer of the retina is intact and therefore the choroid is not visible. There are, however, numerous fine, black powder-like opacities in the posterior part of the vitreous, and due to collection of serous exudate under the retina there is a slight irregular flat detachment of the retina. The detached pigmented epithelium, being cut off from its nutrient blood-vessels, soon atrophies and so the choroidal exudate and extravasates of blood will be visible as irregular red and light grayish yellow spots. These spots are very characteristic for given diseases.

In metastatic purulent choroiditis there are multiple yellow masses, which soon break through the detached retina into the vitreous. Panophthalmia develops when metastatic anterior uveitis occurs. In sero-fibrinous choroiditis, after a certain time, the stage of exudation is followed by the stage of organization and resorption. The retro-retinal and choroidal exudate organizes or disappears. In its place the atrophic choroid will be visible. If the inflammation completely destroys the choroid, the interior

surface of the sclera will be visible. The ophthalmoscopic examination presents the choroidal blood-vessels with normal width and walls or with a narrowing of the lumina, occlusion, mural beads and thickenings. There may be choroidal, retinal and hematogenous pigment and also cicatricial, whitish, glistening spots. In this stage atrophy of the optic nerve and retina may occur. The vitreous opacities may remain permanent. Exudate masses and hematomas may organize in the vitreous. We speak of endogenous or exogenous; acute or chronic; diffuse, disseminate and peripapillary choroiditis. The etiology and treatment of this disease coincides with that of iritis.

Calcification and ossification are very rare in the choroid,

Neoplasms. Primary melano- and leuco-sarcoma and metastatic carcinoma occur in the choroid. These rare diseases can be diagnosed with the ophthalmoscope in a very early stage. A small, flat, solid, retinal detachment appears. Its surrounding will be soon pigmented and its size increases. At this stage there are no vitreous opacities or changes in the intraocular tension. If the spot is situated towards the *ora serrata,* where the beam of the transilluminator may reach it, the pupil will not flare up when the transilluminator is placed over the suspicious spot. Enucleation should be done at this stage promptly, to save the life of the animal. The differential diagnosis from small, disseminate choroiditis, choroidal parasites and tuberculoma must be made beforehand. If there is a neoplasm somewhere in the body, naturally removal of the ocular metastasis will have palliative (cosmetic) effect only. The further fate of the choroidal neoplasm parallels that of the neoplasms of the iris.

Injuries: Indirect traumatism may cause rupture of the choroid without rupture of the retina. In recent cases strong inflammatory reaction will be noted. After this stage has passed, more or less vertical or slightly curved retro-retinal cicatrices and pathological pigment will be visible. Traumatic hemorrhage, detachment and lodgment of foreign bodies may occur in the choroid.

Long Vigil Ended

For three days and three nights, Miss Mary Knittle, of Maquoketa, Iowa, went without sleep to keep watch over Jerry, brown cocker spaniel, which has been her pet for nine years. Jerry had been ill for several weeks of an undiagnosed ailment and his mistress was his constant companion. When, toward the end of her long vigil, Miss Knittle fell asleep, she awoke to find her beloved pet dead.

HYPERSENSITIVITY IN RABBITS IMMUNE TO THE PROTEIN OF BOT-FLY LARVAE*

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Extensive work has been done on the immunological specificity of bacteria, but it has been only recently that investigations have been conducted on the immunological specificity of parasites. Bachman[1] found that typical skin reactions appeared as early as the second day after feeding a rabbit trichinous meat, and that all rabbits infected with Trichinella showed local skin reactions following intracutaneous injection of Trichinella protein. Coventry[2] demonstrated that skin reactions follow the intracutaneous injection of ascaris extracts into rabbits and guinea pigs infected with ascaris, and occur as well in rabbits, and perhaps also in guinea pigs, immunized with ascaris extract. Precipitins were demonstrable in the serum of infected and immunized rabbits, but the precipitin content of the serum failed to parallel the intensity of the skin reactions. Canning[3] showed the specificity of various tissues of *Ascaris lumbricoides* and related helminths.

Hadwen and Bruce[4] produced anaphylactic shock in cattle and sheep with the larvae of *Hypoderma bovis, Hypoderma lineatum,* and *Oestrus ovis.* These investigators found that the reactions could be induced by crushing and returning an extract of the animals' own larvae into the jugular. Eye and other local reactions were obtained with extracts applied to the mucous membranes. Small animals sensitized with warble extracts were anaphylactic to a second injection.

This investigation was made to determine whether or not, anti-bot-fly larvae factors could be produced in the rabbit, which could be demonstrated by means of cutaneous, ophthalmic, and precipitin tests. The principal object of the experiment, therefore, was an attempt to provide a diagnosis for the infection.

METHODS OF PROCEDURE

Five rabbits were used in the experiment. Three of these were injected intravenously with equine strains of bot-fly antigen. One of the remaining pair had been infected previously with Trichinella, and was, therefore, used to test for the specificity of the reaction. The fifth rabbit served as a normal control.

*Investigation conducted in the laboratories of the Department of Bacteriology, University of Tennessee, upon the suggestion of Dr. Graeme A. Canning, Department of Zoölogy, University of Tennessee. Received for publication, May 7, 1935.

The antigen was prepared by drying and grinding bot-fly larvae which had been taken from the gastric mucosa of a horse. The preparation of the antigen required considerable time, as difficulty was experienced in dehydrating it to such an extent that a powder could be obtained. The powdered antigen was suspended in Coca's solution, placed in sterile, rubber-stoppered bottles, and kept in the refrigerator until used. Injections were made intravenously at intervals of four days. The standard dose given was one cubic centimeter. After the animals had received five injections, they were tested for a cutaneous, an ophthalmic, and a precipitin reaction.

The cutaneous test was made by shaving an area on the flank, approximately an inch wide and two inches long, and injecting intradermally, at one end of the shaved area, 0.2 cc of powdered bot-fly larvae, and a control of 0.2 cc Coca solution at the other extremity. The reactions were read at the end of 30 minutes, 1 hour, 2 hours, 18 hours, 24 hours, and 40 hours. The results are shown in table I.

TABLE I—*Results of cutaneous tests.*

RABBIT	REACTION	
Immune 1	Anterior end:	inflammation. Edematous area 2x3 cm
	Posterior end:	no reaction
Immune 2	Anterior end:	slight inflammation. Much swelling with edema. Edematous area 3x3 cm
	Posterior end:	no reaction
Immune 3	Anterior end:	small edematous area 1x1 cm
	Posterior end:	no reaction
Trichinella	Anterior end:	no reaction
	Posterior end:	no reaction
Normal	Anterior end:	no reaction
	Posterior end:	no reaction

TABLE II—*Results of ophthalmic tests.*

RABBIT	REACTION	
Immune 1	Right eye:	slight inflammation, watering
	Left eye:	slight inflammation
Immune 2	Right eye:	blinking, irritation, rubbing with front paw
	Left eye:	no reaction
Immune 3	Right eye:	slight inflammation
	Left eye:	slight inflammation
Trichinella	Right eye:	blinking, watering
	Left eye:	slight inflammation
Normal	Right eye:	slight inflammation
	Left eye:	no reaction

The ophthalmic test was conducted by dropping into the right eye of each of the rabbits 0.05 cc of bot-fly larvae antigen. As a control 0.05 of Coca solution was dropped into the left eye of each rabbit. The reactions were observed at the end of 5 minutes, 10 minutes, 20 minutes, 30 minutes, 1 hour and 2 hours. The results are shown in table II.

The precipitin reaction was conducted by the ring-test method. Dilutions of the antigen were placed in standard precipitin tubes and underlaid with immune serum. A ring of flocculent precipitate at the junction of the antigen and serum indicated a positive reaction. The results are shown in table III.

TABLE III—*Results of precipitin tests.*

RABBIT	DILUTION						SERUM CONTROL	ANTIGEN CONTROL
	1	1:2	1:4	1:8	1:16	1:32		
Immune 1	++++	++++	+	+	−	−	−	−
Immune 2	++++	+++	++	+	−	−	−	−
Immune 3	++++	++++	+++	+++	++	+	−	−
Trichinella	−	−	−	−	−	−	−	−
Normal	−	−	−	−	−	−	−	−

DISCUSSION OF RESULTS

The results obtained by the ophthalmic reaction were of no value, since irritation of the tissues was probably due to coarse particles of antigen, rather than to anaphylactic shock.

The results of the cutaneous tests were, as a whole, very satisfactory. Edematous areas of varying degrees of intensity developed, following intradermal inoculation of the immune rabbits with the bot-fly larvae antigen. Since the Trichinella rabbit, and the normal rabbit showed no edema at the site of inoculation, it may be considered that the reaction is specific.

The precipitin tests proved to be quite satisfactory. An interesting development was that rabbit 3, an animal which showed a faint cutaneous reaction, gave the strongest precipitin reaction of any of the immunized rabbits. This tends to verify the statement of Conventry, that the intensity of skin reactions fails to parallel the precipitin content of the serum.

It is apparent that the antigenic properties of bot-fly larvae are less intense than those of the helminths, since Conventry showed that the precipitins in the serum of rabbits and guinea pigs immunized with ascaris persisted for at least eight months, whereas bot-fly larvae precipitins disappear within about three weeks.

Conclusions

1. Rabbits immunized with equine bot-fly larvae protein react to the cutaneous test. The reaction is of the "hypersensitiveness to infection" type.

2. The cutaneous test may have practical diagnostic significance.

3. Precipitins are demonstrable in the blood-serum of rabbits immunized with bot-fly larvae antigen, but they disappear very rapidly.

4. Precipitin, or cutaneous, reactions are specific.

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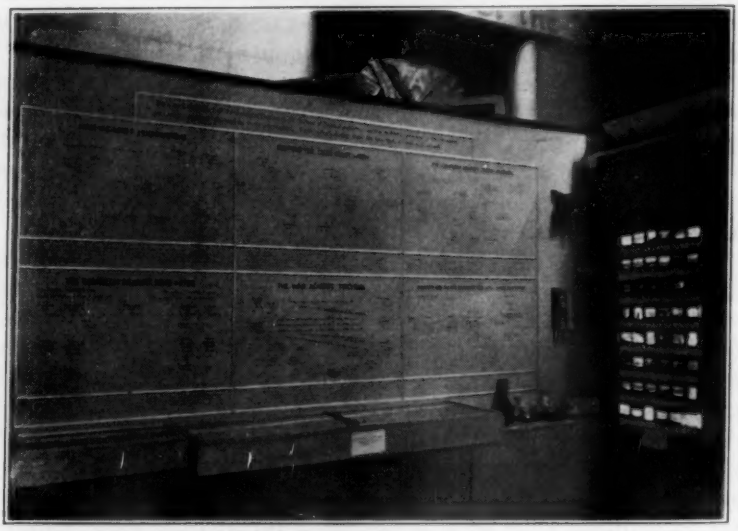
There are no points of the compass on the chart of true patriotism.—Robert Charles Winthrop.



Section of Veterinary Exhibit at California Pacific International Exposition

ADDITIONAL OBSERVATIONS ON THE TOXICITY OF CROTALARIA SPECTABILIS (ROTH) FOR SWINE*

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The authors[1] have recently reported on the toxicity of *Crotalaria spectabilis* (Roth) seed for swine under experimental and natural conditions. Since Neal, Ahmann and Rusoff[2] have been able to isolate the toxic principal, an alkaloid, from both the plant and seed it was considered advisable to further study field conditions under which swine had access to *C. spectabilis* in order to determine whether the toxic effects in naturally occurring cases were caused by the green plant or seed or both.

The source of the toxic principal would also seem important as *C. spectabilis* is one of the most luxurious growing species of crotalaria and is particularly adapted as a cover crop on most of the poorer soils. This species already has a wide distribution in Florida and its popularity has spread to many other southern states.

OBSERVATION I

Stokes[3] has been studying several crop rotation plans in which *C. spectabilis* and *C. striata* are planted every second year, corn and peanuts planted after the crotalaria is plowed under, and crotalaria planted at the time of "laying by" corn and peanuts. This past year, September 19, 1934, 17 hogs averaging 60 pounds were placed on the plots to graze the corn and peanuts. The animals were sold December 11, weighing an average of 182.3 pounds. On November 13 a heavy frost killed the green plants. One animal showed indisposition on December 6 and was removed. This animal died five days later weighing 183.7 pounds. Typical gross and microscopic lesions of *C. spectabilis* poisoning as observed in previous experimental and field cases[1] were noted. The remainder of the herd was killed in a slaughter-house with veterinary inspection. The livers of these animals showed the typical discoloration found in *C. spectabilis* poisoning, but were passed for food.

OBSERVATION II

Two cases of naturally occurring cases of *C. spectabilis* were observed in one lot of hogs in an experiment in which various crops were being fed. This particular lot consisting of 6 animals was placed on corn and peanuts July 13, 1934. There was a poor

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voluntary stand of *C. spectabilis* in this lot. This plant was the only green feed available. The animals had made satisfactory gains. The two animals died showing typical gross lesions of *C. spectabilis* poisoning on August 28, 1934.

OBSERVATION III

On December 15, 1934, ten pigs averaging 26.7 pounds were placed on a plot of peanuts in which every second row was planted to *C. spectabilis*. A killing frost had occurred and no green feed was available. Many of the pods had opened and the ground was literally strewed with seed, approximately five per square inch. The animals were allowed to graze on this plot until it was depleted of peanuts and then were moved to a second plot similarly planted. Satisfactory gains were not made for which a number of conditions might have contributed. However, all but three of the animals were thrifty. On March 9, 1935, all animals in this lot were slaughtered. Seven showed but little indications of having eaten the seeds of *C. spectabilis*. The three animals that had previously appeared unthrifty showed typical discoloration of the liver, though not intense in nature.

A histopathological study was made of the tissues of all the animals in this group. The tissues of those animals which appeared unthrifty before slaughter showed well marked microscopic lesions of *C. spectabilis* poisoning. The tissues of remaining animals which appeared in good physical condition before slaughter showed characteristic microscopic lesions of *C. spectabilis* poisoning although in all cases such lesions were not marked.

DISCUSSION AND SUMMARY

From the above observations it would appear that swine under field conditions are more likely to be poisoned by the green foliage of *C. spectabilis* than by the seeds of this plant. It also appears that swine will eat the green plant much more readily when there is not an abundance of other green feeds. *C. spectabilis* being of such a thrifty nature remains green until frost and long after other green feeds have died by the heat and dryness of late summer and it is under these conditions that many animals eat this plant.

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THE MIGRATION OF HOG CHOLERA VIRUS WHEN SUBJECTED TO ELECTROPHORESIS*

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Electrophoresis as defined by Buchanan and Fulmer[1] is the phenomenon of the migration of colloidal particles under the influence of the electric current, anaphoresis and cataphoresis designating the migration to the anode and cathode, respectively. The etiologic factor of virus diseases has long been regarded as colloidal in nature or associated with the colloidal constituents present in blood serum and tissue extracts. Consequently its behavior was believed to resemble that of colloids when subjected to electrophoresis.

One of the first observations of this phenomenon was made by von Angerer.[2] He observed that bacteriophage in an electric field migrated toward the anode. Later Koch,[3] in his studies on the Shiga bacteriophage, claimed that it moved toward the cathode. Neither von Angerer nor Koch mentioned the hydrogen-ion concentration at which they worked. Since protein colloids behave differently in acid and basic solutions it is difficult to interpret their results.

Charles Todd[4] carried out some careful experiments on the nature of the electric charge carried by bacteriophage. He devised one of the most effective and conveniently constructed pieces of apparatus for this type of work. His investigations on the electrical migration of bacteriophage for *B. shigae*, at a number of points over ranges between pH 3.6 and 7.6, showed that it possessed a negative charge because of its migration toward the anode.

Bedson and Bland[5] made careful studies on the electric charge carried by virus particles. Brown and Broom[6] studied the action of the electric current on bacteria. Herzberg,[7] in his experiments with vaccine virus, found that the virus in greater concentrations migrated with greater speed. Kligler and Olitsky[8] found that typhus virus migrated to the positive pole. Thompson[9] conducted his studies on normal and chemically treated pneumococci. Olitsky and Boez,[10] in working with foot-and-mouth disease virus, found that under ordinary conditions it carries a positive charge and they also called attention to the fact that it differs from the known cultivable bacteria which are usually electronegative. Douglas and Smith,[11] working with vaccine virus, found that the virus was rendered inactive at a pH below

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5.0 and that it carries a negative electric charge over a range from pH 5.5 to pH 8.4. Lepine[12] worked on the cataphoresis of fowl pest. Hobbs[13] made detailed studies on the myoma virus of rabbits. Lewis and Michaelis,[14] in their investigations with the Rous sarcoma, found that the etiologic agent was active between the pH of 4.0 and 12.0 and carries an electronegative charge.

The contributions made by these investigators and many others, carrying on their studies with viruses which are responsible for many infectious diseases, have given us considerable information concerning the physical and chemical properties of these agents. Although all do not agree in their findings and the interpretations of their experimental results, many of their findings have been confirmed. When one considers the possibility of diverse strains of viruses responsible for certain specific diseases, the variations in technic and the irregularities experienced in the reaction of experiment animals to infection, it is not surprising to find disagreement between investigators.

The review of the literature pertaining to the investigations carried out on the virus of hog cholera does not reveal its behavior toward electrophoresis. With this in mind, this series of experiments was conducted to determine the migration of hog cholera virus when subjected to electrophoresis.

Methods and Material

The apparatus used was similar to that used by Todd, with some modifications. The two side arms of a large three-way stopcock were turned to a vertical position two inches from the center tap. Pyrex test-tubes (2x15 cm) were drawn out from the base and welded to the three arms of the stopcock in a vertical position. The capacity of the entire apparatus was 75 cc. The side chambers of the apparatus were connected by two inverted U tubes, 5 mm in diameter, with small glass bottles containing non-polarizable electrodes. These tubes were filled with 1 per cent saline in 2 per cent agar. A motor generator equipped with a volt meter and field rheostat proved to be the most satisfactory source of electricity. A milliammeter was placed in the circuit to indicate the strength of current passing through the apparatus. A uniform temperature of 37° C. was maintained throughout the period of the experiment. The glass apparatus was carefully cleaned and sterilized. Two loose cotton plugs were introduced through the side chambers into the horizontal portions of the tubes one inch from the stopcock. In preliminary tests with dyes there was no indication of diffusion

beyond these cotton plugs for 24 hours, which was a far greater period of time than was required to run an experiment.

The virus used in these experiments orginated from field cases of hog cholera. It was filtered to eliminate the possibility of bacterial contamination and passed through susceptible swine. The dilution used was 25 cc of serum virus to 75 cc sterile physiologic saline solution. The pH values were determined by means of the glass electrode described by Goodhue *et al.*[15] The pH range used in these studies was 5.0 to 9.0. The potency of the virus within this range was not materially affected. Dilute sodium hydroxide and hydrochloric acid in physiologic saline were used as buffers to secure the desired hydrogen-ion concentration. The buffers were sterilized, placed in the refrigerator and their pH values were checked before use. The serum virus, after being adjusted to the proper pH, was filtered through a sterile Berkefeld "N" filter to remove possible bacterial contamination before being placed in the center chamber of the sterile apparatus. The sterile buffer solutions were placed in the side chambers of the apparatus after the agar bridges were in position. The level of the liquid in the side chamber was slightly higher than the level of the serum virus in the center chamber so that when the stopcock was opened, the movement caused by the equalization of the liquid levels of the three chambers would be toward the center chamber. This precaution was taken to prevent possible migration of the serum virus into the side chambers due to hydrostatic pressure.

Experimental

The experiments were conducted in the following manner: A current of 120 to 125 volts from a direct current motor generator was found necessary to maintain a flow of 20 milliamperes. In preliminary experiments this strength of current was found suitable and as far as could be determined did not materially affect the potency of the virus. For the sake of uniformity all experiments were conducted in the same manner and under as nearly the same conditions as were possible to maintain. All experiments were conducted for a period of three hours, with no interruptions in the current at any time. There was no interference with the apparatus in any way during the course of the experiments so that the diffusion of the serum virus with resulting errors was not possible. At the end of the period in which the serum virus was subjected to the action of the electric current, the stopcock was closed, completely breaking the electric circuit. The agar bridges were removed from the side chambers of the apparatus and the liquids were withdrawn from the cham-

bers with sterile pipettes. The liquids were placed in sterile test-tubes which were tightly closed with cotton stoppers.

The experiment animals were placed in isolated units and a series of preinoculation temperatures were taken. Two cc of liquid from each of the chambers was injected into susceptible pigs. The pH was checked on the remaining portions of the liquids and qualitative tests for the presence of proteins were made. The animals injected with the liquid from the center chamber of the apparatus acted as a check on the potency of the virus. Temperatures of the experiment animals were recorded and symptoms observed. The diagnoses were made from the postmortem examinations. Cultures were made from the heart-blood, liver and spleen in order to detect any possible bacterial infection. These cultures proved negative. The experiment animals which did not contract the disease as a result of the intra-muscular injections of these liquids were used in other tests by which their susceptibility was ascertained.

A summary of the electrophoresis experiments and the results of tests for the presence of hog cholera virus in the liquids taken from the chambers of the apparatus are given in tables I and II.

TABLE I—*Summary of electrophoresis experiments.*

EXPERIMENT	SERUM VIRUS	VOLTAGE	MILLIAMPERES	pH
1	4711	125	20	5.0
2	F6	120	20	6.0
3	4745	122	20	7.0
4	4745	120	20	8.0
5	4751	120	20	9.0

Time, 3 hours; temperature, 37° C.

SUMMARY AND DISCUSSION

This series of experiments on the serum virus of hog cholera shows clearly that the migration takes place toward the positive pole within the specified hydrogen-ion range. In experiment 2, pig 4760, which was inoculated with liquid from the center chamber of the apparatus, did not develop hog cholera. Later tests with virus of known potency demonstrated beyond doubt that this pig was not susceptible to hog cholera. It was not considered necessary to repeat this experiment because the experiment animal inoculated with liquid from the center chamber acted only as a check on the potency of the virus at that particular hydrogen-ion concentration at the termination of the experiment. This necessary check was furnished by pig 4740, which was in-

TABLE II—*Results of animal inoculation.*

EXPERIMENT	INOCULUM	PROTEIN TEST	TEST PIG	REACTION	DIAGNOSIS
1	Positive pole	+	4712	+	Hog cholera
	Center chamber	+++	4714	+	Hog cholera
	Negative pole	−	4715*	−	− −
2	Positive pole	+	4740	+	Hog cholera
	Center chamber	+++	4760†	−	− −
	Negative pole	−	4749*	−	− −
3	Positive pole	+	4753	+	Hog cholera
	Center chamber	+++	4750	+	Hog cholera
	Negative pole	−	4759*	−	− −
4	Positive pole	+	4751	+	Hog cholera
	Center chamber	+++	4752	+	Hog cholera
	Negative pole	−	4755*	−	− −
5	Positive pole	+	4756	+	Hog cholera
	Center chamber	+++	4757	+	Hog cholera
	Negative pole	−	4758*	−	− −

*Pigs 4715, 4749, 4759, 4755 and 4758 all proved to be susceptible to hog cholera by subsequent test.
†Pig 4760 immune to hog cholera.

oculated with liquid from the positive pole and developed a typical case of hog cholera. Pig 4749, which was inoculated with liquid from the negative pole and did not develop hog cholera, proved to be susceptible as the result of a subsequent inoculation.

CONCLUSIONS

1. The serum virus of hog cholera migrates toward the positive pole at pH values from 5.0 to 9.0.

2. The virus of hog cholera either carries a negative electric charge or is carried toward the positive pole by the associated proteins.

3. It is not possible within the pH range studied to separate hog cholera virus from the associated proteins by the electrophoretic method employed.

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Doctor L. Enos Day Honored

Dr. L. Enos Day (Ont. '92), of Chicago, Ill., who retired from the U. S. Bureau of Animal Industry on July 1, 1935, after 38 years of continuous service, was the honor guest at a farewell dinner given by the Chicago members of the Bureau staff, at the Auditorium Hotel, Chicago, on June 27. Sixty-five of Dr. Day's Chicago associates were present at the dinner. Dr. G. E. Totten, Inspector-in-Charge at Chicago, was master of ceremonies. Tributes to the life and work of Dr. Day were given by Drs. J. S. Koen, M. Guillaume and J. J. Lintner. For entertainment, Mr. Oscar Green, well-known radio baritone, sang a number of songs, one of which was dedicated to Dr. Day. At the conclusion of the festivities, Dr. Totten presented the honor guest with a solid gold wrist watch which bore the following inscription: "Presented to Dr. L. E. Day by Chicago B. A. I., June 27, 1935."

Dr. Day has been in charge of the Chicago Branch Pathological Laboratory since it was organized in 1906. At that time he started getting together a collection of pathological specimens which has since grown to be one of the finest in the United States. He is a member and past president of the Chicago Pathological Society. In addition to his membership in the A. V. M. A., Dr. Day also holds a certificate of honor from the American Medical Association. During his long career in the Bureau, he made a number of important discoveries and observations and he has written many valuable articles dealing with pathological conditions in meat food animals. He has engaged in four different outbreaks of foot-and-mouth disease and is considered an expert in diagnosing this disease. He was the first to recognize tuberculous skin lesions in cattle. Dr. Day attended the Tenth International Veterinary Congress at London, in 1914, and the Twelfth at New York last year.

J. S. B.

WILL BOTULISM BECOME A WORLD-WIDE HAZARD TO WILD FOWL?*

By E. R. KALMBACH, *Washington, D. C.*
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During the past quarter of a century, botulism, formerly referred to as alkali poisoning, duck sickness, or western duck sickness, when it appeared among wild fowl, has taken an intermittent and, in some years, a disastrous toll from birds living under natural conditions in our western states.[1] Although no single outbreak has equaled in sheer intensity the memorable one that occurred in the marshes about Great Salt Lake in the summer of 1910, there have been years in which the mortality, even in single areas, has exceeded 100,000 birds. In 1932, it was estimated that fully a quarter of a million wild fowl perished at the northern end of Great Salt Lake. On the basis of distribution and occurrence, it appears that epizoötics of botulism among wild birds have increased in frequency and that the range of the malady in North America has been extended during the past two decades.

Within the past ten years, enzoötic botulism among wild fowl has been reported in North America at possibly a score of places where it had not been previously noted. At the present time, this manifestation of botulism, reported with reasonable authenticity and correctness of diagnosis, extends from points well north of the Canadian border (Welstead Lake, Alta., 58° 30′ n. lat.) to Arizona and New Mexico; and from southwestern Minnesota to the warm valleys of California. (See map, figure 1.) There has also been an instance of excessive waterfowl mortality in northeastern Durango, Mexico (1925), that may be attributed to botulism.[2] In South America, similar mortality was observed some years ago (1921) in Uruguay under environmental conditions strikingly like those prevailing in infected areas in this country.[3]

The foregoing comments, of course, pertain to botulism in epizoötic form among wild birds living under natural conditions; and have no connection with manifestations of this same malady among domestic poultry or live stock, where the source of infection usually is local and man-made.

Of more than ordinary interest to both the bacteriologist and the conservationist is the recent demonstration by E. Murray Pullar, that botulism is a hazard to wild fowl even in distant Australia.[4] His discovery not only focuses further attention on

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a malady that has seriously threatened the welfare of our waterfowl, but it also lends a measure of corroboration to the results of earlier studies in this country.

During the summer of 1931-32, the malady was reported at four points in northern and western Victoria. All the outbreaks were associated with hot, dry weather (shade temperature being from 95 to 110° F.), low water, and an abundance of rotting

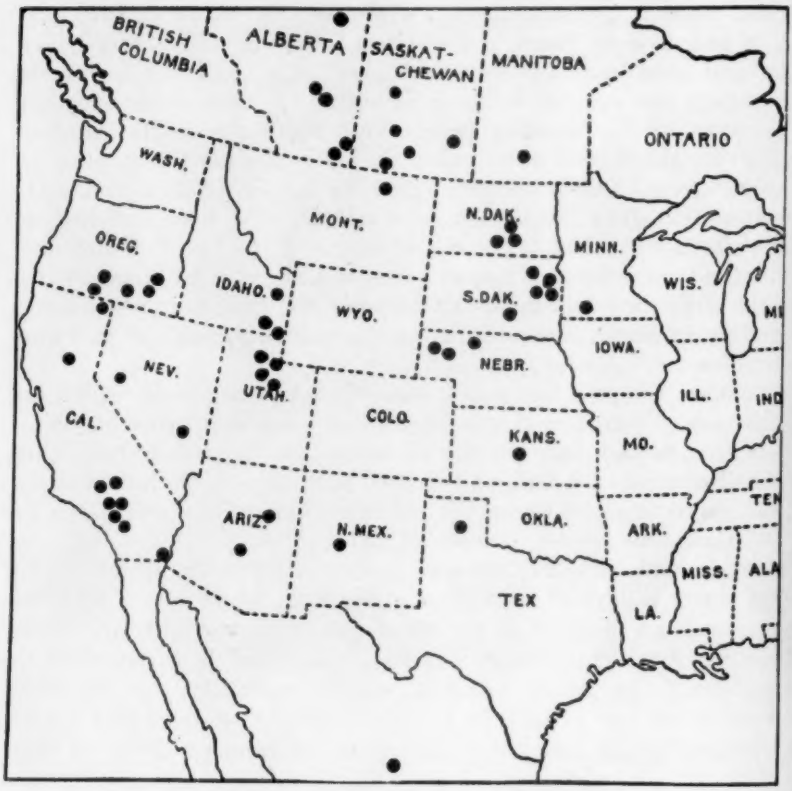

FIG. 1. Map showing the range of epizoötic botulism among wild fowl in North America. Each of the dots represents the location of one or more outbreaks during the period 1910-1934. Definite bacteriological evidence of botulism is available for only a small portion of the localities indicated, but in most cases typical symptoms have been noted and characteristic environmental conditions conducive to botulism prevailed.

vegetation. At the 10,000-acre Winton swamp (near Benalla, 100 miles northeast of Melbourne, hundreds of birds died under conditions strongly suggestive of outbreaks that have occurred in our own West. On the advent of cooler weather in April, the malady disappeared. In the following summer (1932-33), a

severe outbreak appeared at the Hume reservoir along the Murray River, where the deep mud, rotting vegetation, and decaying bodies afforded an excellent medium for the growth of Clostridium.

The symptoms described by Pullar correspond with those discerned in this country, among them being the sluggishness or immobility of the nictitans membrane. Since the earliest studies of the malady in this country, this symptom, somewhat analogous to the ptosis manifest in human botulism, has been looked upon as a characteristic, though not pathognomonic, symptom of the

FIG. 2. This picture was taken on the south shore of Willard Spur, at the northern end of Great Salt Lake, in the fall of 1932. The dead lay at the rate of 8,000 to 10,000 to the mile of shore line.

disease. The absence of pronounced postmortem changes in the Australian birds has its counterpart in ours.

In arriving at his diagnosis of botulism, Pullar presented arguments that rule out of the picture such other concepts as intoxication by copper salts employed to combat algal growth, toxic algae themselves, lead poisoning, and intoxication from high concentrations of alkaline salts.

With respect to the causative organism, Pullar states that "the toxin was neutralized by type C parabotulinum (Seddon) and polyvalent A-B-C antisera, while type A antisera failed to neu-

tralize it, thus identifying the organism as *Clostridium parabotulinum* (Seddon)." Whereas Giltner and Couch[5] identified the organism associated with "duck sickness" cases in America as *Clostridium botulinum* of type C, without further differentiation, Gunnison and Coleman,[6] in their noteworthy study of the organism, referred to it as type C, alpha, a varietal designation first used by Gunnison and Meyer[7] a few years earlier (1929). The parabotulinum of Seddon is considered by these later American workers to be the other variant, beta, of type C. It would appear, therefore, that "duck sickness" on the two distant continents is caused by closely related yet distinguishable variants of the same organism. It is of interest to note that, although Gunnison and Coleman found that toxin derived from a type C, beta, strain isolated by Seddon was approximately ten times more toxic for ducks than material from American "duck sickness" sources, Pullar has observed the recovery of many of the afflicted birds "if placed in pens and fed on clean fresh food and water." A similar high degree of recovery takes place in American outbreaks, the inference being that the birds ingest only quantities or extreme dilutions of the toxin.

Under Victorian conditions, Pullar states, the disease does not appear to be always associated with alkaline waters. Apparently he had in mind waters with a high salt content and was not speaking of alkalinity in a pH sense, since he reports a pH of 7.6 for the water of the Hume reservoir, while some of the other waters were said to be brackish. As pointed out by Kalmbach and Gunderson,[8] alkalinity may actually be a determining factor in the incidence of enzoötic botulism among wild birds, through its effect on the growth and well-being of the causative organism. Moderate alkalinity appears to be highly favorable, perhaps a prerequisite, while excessive alkalinity or high concentrations of salines may destroy toxin or inhibit growth of the organism.

With events in Australia paralleling somewhat the course of early ones on this continent, certain questions arise concerning the possible future course of enzoötic botulism among wild birds. Are we to witness added extensions of the range of this malady? Is the organism itself undergoing a "period of ascendency," or are man-made conditions working to its advantage while wild fowl, through a reduction in their habitats, are being forced to live under less wholesome conditions? In this country man's diversion of water has led to conditions of stagnation during periods of hot weather; these were less prevalent under primeval conditions. A restoration of wholesome, adequate and stable water supplies on wild fowl areas will, it is believed, go far toward remedying the deplorable condition.

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Wild Ducks Bootlegged

A duck bootlegging syndicate has been uncovered on the eastern shore of Virginia and Maryland, according to the Elizabeth City (N. C.) *Independent*. Agents of the U. S. Game Management Division of the Biological Survey, and of the Department of Justice, assisted by state officers of Maryland and Virginia, have estimated that from 200,000 to 400,000 wild ducks have been slaughtered annually in the Chesapeake Bay area. The wild waterfowl are trapped by the thousands and then bootlegged out of the state labeled as sea food or some other product.

New Publication on Hydatid Disease

To promote international coöperation in the control of hydatid disease is the purpose of a new publication which has been named *Archivos Internationales de la Hidatidosis*. It is sponsored by Centro de Estudio y Profilaxis de la Hidatidosis, of Montevideo, Uruguay, which hopes to compile works and publications from all parts of the world on hydatid disease. In an introduction, the editor, Prof. Velarde Perez Fontana, outlines the aim of the publication as follows:

> The spread of the disease in the Argentine Republic, in Rio Grande State (Brazil) and in our own country has occasioned alarm, but this has not been followed up by sufficient or continuous action on the part of the sanitary authorities. The prophylactic measures adopted with more or less success in other affected areas have not been based on a definite plan owing to the lack of international coöperation, and the necessity for fomenting such coöperation is the justification for this new publication.

It is to be published periodically, and the scientific output and bibliography of every country will be collated annually in its own language and dealt with in a Spanish summary.

A METHOD FOR PRESERVING BRUCELLA ABORTUS FOR USE IN THE PREPARATION OF AGGLUTINATION ANTIGEN*

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Studies[1] in this laboratory have shown that we cannot depend on plate-method antigen preparations to retain their sensitivity longer than about six months under good average conditions. This presents somewhat of a problem for producing laboratories that must be prepared to supply demands for this product and yet not have a quantity of it become outdated, due to an overestimated demand in any given period.

This problem can be overcome satisfactorily by storing the bacteria in a dry condition until they are needed for use in the finished product. The technic for drying the organisms is as follows:

The bacteria are grown on solid media. They are removed from such media in the usual manner by means of 0.5 per cent phenolized, physiologic salt solution. The resulting bacterial suspension should be filtered carefully through cotton, spun glass and gauze, to remove any particles of agar. If this precaution is not taken, the bacteria may be rendered unsuitable for use in the subsequent heating as a result of "agar thermo-agglutination."[2] The filtered suspension is heated to kill the bacteria. This may be done by boiling for ten minutes in a covered container, but for larger quantities it is more convenient to heat the suspension by placing it in a steam-bath for two to three hours. After it has cooled, the suspension should be refiltered as before. The bacteria are then sedimented in a centrifuge and the supernatant fluid removed and discarded. It is advisable to wash the bacteria a second time and discard the supernatant fluid. This is essential because unless it is done the bacterial mass contains a gummy material which cannot, by ordinary methods at least, be evaporated to dryness. In other words, a water-soluble substance is removed from the organisms in the supernatant fluid which, when present, prevents successful drying of the bacterial mass. It has been shown previously[3] that this substance is not only unnecessary in the antigen preparation but that it is somewhat undesirable.

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When large quantities of organisms are being harvested it is convenient to sediment them in a supercentrifuge. Such a centrifuge that has a speed of from 20,000 to 40,000 revolutions per minute will separate the bacteria at a satisfactory rate. Naturally, the higher the speed of the centrifuge, the more rapidly the bacteria can be separated.

The bacterial mass is removed from the bowl of the centrifuge with a spatula, placed in a glass container and weighed. The mass is covered with 0.5 per cent phenolized distilled water. A convenient method is to multiply the number of grams of bacteria (as removed from the centrifuge) by 18 and use that number of cubic centimeters of phenolized distilled water. This results in a suitable concentration for drying the bacteria in the necessary thin film. This bacterial mass, covered with phenolized distilled water, must be thoroughly shaken in a power machine to produce an even suspension. This can be facilitated by placing glass beads in the container with the bacterial mass while it is being shaken. The resulting bacterial suspension is poured into ordinary petri dishes (about 35 cc in a dish four inches in diameter or 55 cc in a dish six inches in diameter). The bacteria may be evaporated to dryness by placing these dishes in an ordinary incubator (37.5° C.) or by placing them before an electric fan. It is essential to dry the bacteria in a thin film. A suitable film results when the above concentration and amounts of suspension are dried. When the film is too thick, it is difficult to resuspend the bacteria in salt solution which is necessary in the preparation of the final product.

The dry bacterial mass will retain its antigenic properties unchanged for an indefinite length of time. It should be stored in glass-stoppered containers at room temperature. We have kept *Brucella abortus* organisms in this manner for 18 months without any appreciable change in antigenic properties. This period is sufficient to serve all practical purposes. It is not known how long such dried bacteria will retain their antigenic properties, but it is likely that the period is much longer than 18 months.

When the bacteria are needed for making the antigen preparation they are resuspended by placing them in the suspensoid and shaking. This operation is facilitated by placing glass beads in the container, which preferably is shaken in a power machine. When 3.1 grams of dried bacteria are suspended in 100 cc of fluid, a suitable bacterial concentration for plate-method antigen preparation results (11 per cent in accordance with the capillary centrifuge-tube method previously described).[4]

The fluid used as a suspensoid in plate-method antigen is prepared as follows: Add 0.85 per cent C. P. sodium chloride and 0.4 per cent gelatin (De-Ashed-Eastman Purified) to distilled water. This solution should be sterilized in the autoclave at 15 pounds of steam pressure for 20 minutes. The volume should be returned to its original after sterilization by the addition of sterile distilled water. A sufficient quantity of melted, loose phenol crystals is added to make a 0.5 per cent solution by volume. It is usually advisable to prepare fresh gelatin solutions each time the antigen preparation is made. Gentian violet and brilliant green are added to the antigen preparation at this time in accordance with Huddleson's recommendations.[5] Using 1 per cent aqueous stock solutions, dyes are added so that the final dilution of gentian violet is 1:50,000 and of brilliant green 1:25,000. The antigen preparation is now ready for use.

This technic provides a very accurate method of fixing the bacterial concentration of test fluid, as well as solving the problem of keeping the bacteria over considerable periods of time.

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Florida Veterinarians Broadcast

Dr. D. C. Gilles (Iowa '12), assistant state veterinarian of Florida, gave a series of weekly talks recently over the Florida Farm Hour from station WRUF. The subjects of the broadcasts were: "Pullorum Disease; How It Affects the Poultry Industry"; "The State Plan for Controlling Pullorum Disease in Poultry," and "Accrediting and Certifying Poultry Breeding Flocks." Dr. A. L. Shealy (McK. '17), of the University of Florida, also presented an interesting broadcast on "Purebred Bulls Build Up the Native Herd." The farm radio programs for Florida are presented by the Agricultural Extension Service of the University of Florida, with the coöperation of the U. S. Department of Agriculture.

MAMMALIAN PHASE OF THE LUNGWORM AELUROSTRONGYLUS ABSTRUSUS IN THE CAT*

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Cameron claims to have demonstrated that the larva of *Aelurostrongylus abstrusus* develops, in the course of three weeks in mice, into infective stages and to have infested cats successfully by feeding them with those mice. No stages of development of the infestive larvae in their supposed intermediate host, the mouse, however, and no stages of development of the lungworm in cats have been observed by this writer.[1]

Our investigations showed that mice can not be infected with first-stage larvae of the lungworm. Various snails and slugs (snails of the genus Epiphragmorphora, namely, *Helminthoglypta californiensis*, Lea; *H. nickleana*, Lea; *H. arrosa*, Gld.; furthermore, *Helix aspersa*, Müller, *Agriolimax agrestis*, Linné; *Ariolimax columbianus*, Gld.) were found to serve as intermediate hosts.[2] Invasion takes place in the way common among Synthetocaulinae, as described previously by the writers.[3, 4] The first molt occurs in about a week, followed by a second molt from two to three weeks later. A third-stage larva results surrounded by two sheaths. For this reason, Cameron's assumption that the first larval stage in this lungworm may be omitted must be discarded. Furthermore, we could demonstrate that poicilotherm animals (frogs, toads, lizards, snakes), birds (sparrows, chickens, ducklings), and small mammals (rodents and others) can be intercalated in the life-cycle as auxiliary hosts. Third-stage larvae, which developed in intermediate hosts as well as those stored in auxiliary hosts, produced infections in cats in our experiments. These findings open the way for intelligent control measures against the parasite, and offer an opportunity to study the development of the lungworm in the actual host.

IMMIGRATION OF THE LARVAE

Larvae are freed in final hosts by the procedure of chewing infected food, during its transportation to the stomach and its stay in this organ. These larvae exhibit great motility in comparison with those located in primary hosts. The larvae enter the mucous membranes of the esophagus, of the stomach, and of the upper intestine. During the first day, they were found in the walls of these organs and in the meshes of connective

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tissues of nearby situated serous membranes. At the end of the first day, some of the larvae already had reached the goal of their migration, the lungs. In some cases numerous larvae were observed in the region of the *margo obtusus*, minor numbers in the *margo acutus*, and a few in the mediastinum and in other parts of the lungs. In other cases, they were found distributed more generally in the lungs, chiefly in the tissues underlying the *facies costalis*.

In the body cavity, parasitic tubercles developed predominantly in the meshes of the omentum. Seldom have they been encountered in the wall of the small intestine and in the mesentery or in the wall and connective tissues immediately surrounding the esophagus in the region of the neck. The structure of these tubercles was similar to that observed by the writers in auxiliary hosts. The lymphatic glands and the liver remained permanently free from invasion. Larvae enclosed in tubercles outside of the lungs failed to show any further development. The increase in the number of these tubercles, which were located in the abdominal cavity under experimental conditions, when compared with cases of natural infection, may have resulted from the forced feeding of the experiment animals, in which the cats swallowed the food without properly chewing it.

Under natural conditions many of the larvae may free themselves in the mouth and the esophagus and consequently invade the wall of the esophagus of their hosts, due to the fact that cats chew their food carefully, vomit readily when the stomach is irritated and often devour the vomitus again. Thus infected food passes along the port of entrance two or even three times. It will be remembered that this procedure is physiologically provided in ruminants by rumination. This fact provides optimal conditions for the liberation and subsequent migrations of lungworms similar to those of *A. abstrusus* (*Muellerius capillaris*, Synthetocauli). Our experiments in cats showed that vomiting did not prevent infections with *A. abstrusus* but on the contrary favored them.

In cases of infections by intermediate hosts the larvae have to discard the two surrounding sheaths and to escape from the enclosing parasitic tubercles. In cases of infection by auxiliary hosts, the sheaths have been abandoned during invasion of the auxiliary hosts. Liberation of the larvae in the final hosts requires, therefore, in this instance, only freeing of the larvae from the parasitic nodules.

Places in which larvae are located in the lungs are marked by small reddish patches of varying limitations. On the second

day they may show grayish-colored centers from 300 to 350μ in diameter. These centers enclose the third-stage larva during the following transformation.

Development of fourth-stage larvae: After their arrival in the lungs, the larvae develop a stage of dormancy. During the second and third days, the inner structure of the larvae becomes indistinct. The length of the third-stage larvae in intermediate hosts is from 450 to 520μ; with a width from 26 to 28μ. The length increases now from 570 to 675μ and the width from 35 to 37.5μ. The larva still exhibits, at this time, the characteristics of third-stage larvae. The sheath, however, now detaches in the region of the head, and the tail and the outlines of a newly formed larva appear. This larva fails to show the strong chitinous stems of the upper part of the esophagus present in third-stage larvae and the tail ends bluntly without the little globular appendix. Between the fifth and the sixth days after invasion, an ecdysis may be seen. Larvae of the free fourth stage are difficult to locate and they are found more accidentally. Their ecdysis is followed immediately by a new state of dormancy, which is the beginning of the transformation into the fifth and final stage.

Free larvae of the fourth stage taper slightly in the esophageal region, are of about the same body width throughout their intestinal region, and end with a relatively short and bluntly pointed tail. The esophagus appears club-shaped and more granulomuscular than it formerly did. The larvae, apparently having been compressed during ensheathment, stretch themselves rapidly. They are from 700 to 1050μ in length and from 40 to 46μ in width, in the region of the junction between the esophagus and the intestine. The length of the esophagus is from 210 to 235μ; the excretory pore opens from 110 to 125μ behind the head and the cuticular rectum is 16 to 25μ long; the length from the anus to the tip of the tail is from 28 to 35μ. No particular changes in the genital primordium are visible. No indications of development of exterior sexual organs can be seen.

Development of fifth-stage larvae: From the sixth to the eighth days, the larvae are ring-shaped. During this stage of inactivity considerable transformations take place in the body structure of the larvae. The final outcome is not only an increase in size but the display of the characteristics of adult stages. As soon as the sheath detaches in the head region, the esophagus, similar in its structure to that found in adult stages, but still more delicate, becomes visible. Its length varies according to the

expansion or the contraction of the larva. Practically no separation of the sheath can be seen along the sides of the larva. Even before the sheath is separated in the region of the tail, deformations of this part of the body become manifest. Swellings, restricted to the region of the anus, indicate future male nematodes. Meanwhile, in future female nematodes the deformation extends from the anus to the region where the vulva is found later. A vast proliferation of cells, restricted to these particular regions, seems to be responsible for the local expansions of the body form. Indistinct folds and lines appear, which unite to form the external and internal sexual organs located in these places.

At the same time, separation of the sheath in the region of the tail becomes visible. As soon as the sexual organs have developed to a degree corresponding to these organs in fifth-stage larvae, the external body form has regained its regular shape. With the detachment of the sheath in future male nematodes, a very minute bursa now becomes visible, which was entirely absent during the fourth stage. As growth of the larva proceeds, even delicate rays develop. Spicules, very faint in appearance in the beginning, become more and more distinct. In future female larvae a fissure develops above the anus, indicating the future vulva. Close to it, in the midst of a mass of cells and vacuoles, the vagina becomes faintly visible. The lines of the body attenuate from the vulva to the bluntly pointed tail interrupted only by the opening of the anus.

Final ecdysis occurs on the eighth or ninth day after invasion. The young nematodes are less fragile and they have increased in motility. A well-defined coelom is now visible. The slender form of their body is similar to that found in adult stages of male and female nematodes. The club-shaped esophagus is more muscular. Its length is from 250 to 260μ. The excretory pore opens from 95 to 100μ behind the head of the nematode. The length of the body in the male larva is increased to 1470μ, while in the female larva it is increased to 2030μ. The width of the female larva at the junction of esophagus and intestine is 60μ, of the male larva 53μ. Length from anus to vulva is 54μ, from anus to tip of tail, 28μ. Uterine ducts and ovaries are in development. The bursa as well as the rays are still small and delicate; the spicules are about 110μ long.

After this the young nematodes grow rapidly until full development in size and structure is attained. The region of the esophagus takes practically no part in these progressive changes.

Copulation

Larval stages from the very first are found in single specimens in the tissues of the lungs. In the course of the third week, however, the nematodes may be seen lying together in pairs, male and female adults. Even more pairs may be encountered in close proximity in heavy infections. These observations suggest by analogy that the males, driven by an unknown instinct at a certain stage of development, migrate in the tissues of the lungs to places where female worms are located. Actual copulation has not been observed. Certain signs, however, indicate that copulation is taking place. The spicules, ordinarily fully retracted, are protruding for half their length, and the tail and inside of the velum may be seen covered with minute granules. Male nematodes measured at the time 4.6 mm in length by 75μ in width; female nematodes, 9.65 mm in length by 95μ in width.

Oviposition

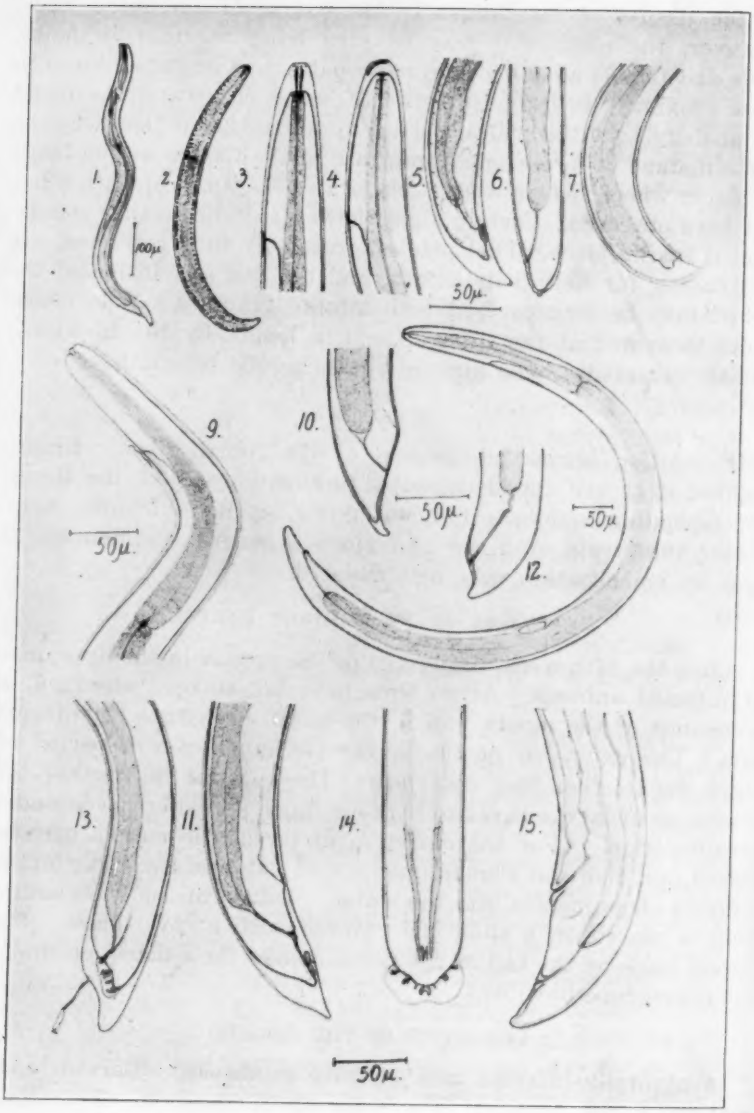
Oviposition begins at the end of the fourth week. Unsegmented eggs are found deposited in small areas of the lungs, corresponding with branchings of single, small respiratory ducts. Under the strain of heavy infections a general distribution of eggs by embolization may be simulated.

Discharge of First-Stage Larvae

After the fifth week, first-stage larvae appear in the droppings of infected animals. At no time have larvae been observed in secretions of the mouth and in the nasal discharges of infected cats. The expulsion of the larvae continues over a period of eight weeks; then they disappear. The question of whether the discharge of larvae is restricted to a single period or not is under consideration. (For the detection of larvae, droppings may be placed in a dish and a small quantity of water added. The larvae migrate consequently into the water. A drop of the supernatant fluid is placed on a slide and covered with a cover-glass. The dorsal spine on the tail of the larvae makes their detection under the microscope possible.)

Longevity of the Adults

In naturally infected cats we have repeatedly observed lungs containing the parasite in a state of calcification. This indicates that in some of the cases the nematode does not disappear by resorption. No data, of course, have been gained from these cases about the actual life-span of the nematode. In our experimental work, male and female adults were found still alive two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weeks after discharge of larvae had ceased. Further studies are required to establish the longevity of the parasite.

Localization and Isolation of Adult Stages

A method of isolating adult stages of *A. abstrusus* has been described by Cameron[5] as follow:

> "An infection in a kitten was diagnosed by the presence of the characteristic larvae in the faeces. The vessels between the heart and lungs were then ligatured close to each of these organs, but without in any way interfering with them. The ligatured portion of the vessels was then removed, opened in saline and the contents shaken out. Fully developed male and female specimens of *Aelurostrongylus abstrusus* were found in these vessels. The lung itself was then removed from the body, and still other adults were recovered in the larger branches of the pulmonary vessels."

We were unable to collect specimens of lungworms in repeated attempts from naturally and artificially infected cats by Cameron's method. In accordance with Mueller[6] we found the lungworms embedded in the tissues of the lungs. It is not unusual to observe with the unaided eye specimens of these parasites lying under serous membranes in superficial tissues of the lungs. The findings are facilitated by the brownish color of the intestines of the nematodes.

The isolation of the parasites encounters some difficulties. Mueller probably was the only investigator who was able to extricate unbroken specimens of the minute nematodes. Our own measurements are based on unbroken and living specimens. According to Cameron, the male nematodes measure in length 4 mm, their spicules 75μ; the female nematodes, 9 mm. According to Mueller, the male worms are 4.9 mm in length, their spicules, 130μ; the female worms, 9.8 mm. In our observations, male nematodes measure up to 7.5 mm in length, their spicules,

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Plate I

Fig. 1. Free third-stage larva.
Fig. 2. Third-stage larva in dormancy.
Fig. 3. Detachment of the sheath in region of head during transformation of third-stage larva into fourth-stage larva.
Fig. 4. Same as figure 3.
Fig. 5. Detachment of sheath in region of tail during transformation of third-stage larva into fourth-stage larva.
Fig. 6. Same as figure 5.
Fig. 7. Same as figures 5 and 6.
Fig. 8. Fourth-stage larva.
Fig. 9. Anterior part of fourth-stage larva near completion of transformation into fifth-stage larva.
Fig. 10. Early stage of transformation of fourth-stage larva into fifth-stage larva; tail region of female nematode.
Fig. 11. Later stage of transformation shown in figure 10.
Fig. 12. Early stage of transformation of fourth-stage larva into fifth-stage larva; tail region of male nematode.
Fig. 13. Later stage of transformation shown in figure 12.
Fig. 14. Fifth stage; male larva.
Fig. 15. Fifth stage; female larva.
The drawings have been made after living larval stages secured from lungs of experimentally infected cats.

from 130 to 150μ; the female nematodes, up to 9.86 mm. The conclusion is reached that Mueller dealt with not yet fully grown male nematodes and that Cameron worked with not fully developed male and female worms.

Transmission of the Parasite to Dogs

Two dogs, three and four months old respectively, were fed with infective larvae. No larvae appeared in their droppings during an observation period of ten weeks. Postmortem examinations at the beginning of the eleventh week failed to show adult stages of the nematode. Small parasitic tubercles, similar to those observed in auxiliary hosts, were located in both dogs under the serous membranes of the upper intestine and contained only dead and calcified larvae. These probably originated from the feeding experiments. From these observations, we may conclude that the dog is not a host of *A. abstrusus*.

Conclusion

The life-cycle of *Aelurostrongylus abstrusus* is as follows: Infective larvae of the lungworm develop after two moltings in various snails and slugs. Intercalation of different auxiliary hosts is possible. Infections result from invasion of the lungs only of cats, in which the third-stage larva undergoes two moltings and attains the final characteristics of male and female adults after the fourth and fifth stages have been passed. This type of development is different from the life-cycle of any other lungworm known at the present time, due to the possibility of intercalation of auxiliary hosts and due to the exclusive development of these nematodes in the lungs. This is the first description of the life-history of a lungworm belonging to the large and important group of Synthetocaulinae.

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The good man prolongs his life; to be able to enjoy one's past life is to live twice.—MARTIAL.

RECOVERY FROM JOHNE'S DISEASE

Report of a Case*

By W. A. HAGAN and ALEXANDER ZEISSIG
Department of Pathology and Bacteriology
New York State Veterinary College, Ithaca, N. Y.

Johne's disease, or paratuberculosis of cattle, is slowly but surely spreading among American cattle. The importance of this fact is not sufficiently appreciated. It is only when one studies the behavior of this disease in certain foreign countries, where it has become much more prevalent than it has here, that he comes to a realization of what the disease will eventually mean to dairymen of this country, if it is allowed to spread unchecked.

The disease is more than ordinarily insidious because of (a) the variable and sometimes very long incubation periods, (b) the fact that the principal symptoms, emaciation and scouring, frequently are attributed to other causes, and (c) that the lesions of the disease are not striking and may easily be overlooked at autopsy. A recent experience with one of our experiment animals has brought to our attention another situation that may be of greater importance than we have hitherto realized in maintaining infection in a herd, and spreading it to others, namely, the long period during which an animal may remain infectious, although symptom-free, after exhibiting definite evidence of the disease.

In November, 1926, three strong, well-developed heifers about nine months of age were drenched with infective material from two animals that had died of Johne's disease. One of these animals (J. D. 3) began to show clinical evidence of the disease about ten months later. At about the eleventh month, active scouring began and she died of Johne's disease almost exactly 13 months after the date of infection.

*Received for publication, July 12, 1935.

The second animal (J. D. 2) first showed symptoms of the disease during the 23rd month after the infection date. In the meantime she had grown well, had been bred, and had given birth to a vigorous calf. Emaciation and scouring began within two weeks after calving. This continued unabated until she died of the disease in the 25th month after infection.

We have reported the results of a considerable number of artificial infections of cattle with Johne's disease by the introduction of infective material *per os*.[1] The behavior of these two animals was in no way atypical of the group. It was the third animal (J. D. 1) that behaved rather remarkably, and it is this animal that is the subject of this report.

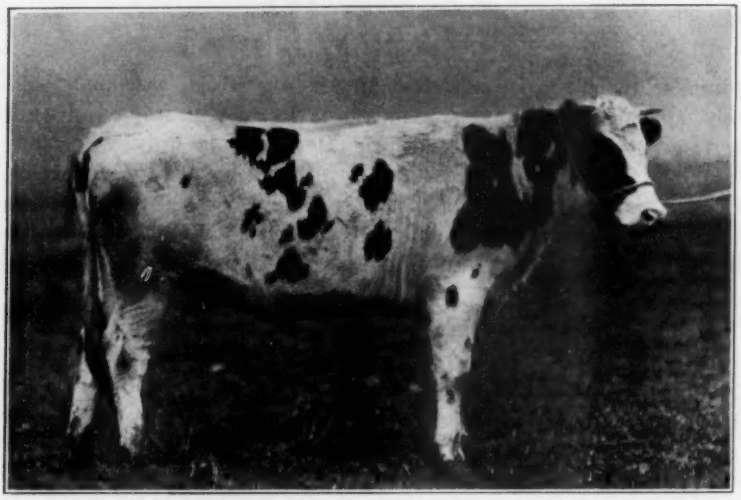

FIG. 1. Holstein heifer, J. D. 1, one year after date of infection, when 21 months of age. Up to this time the animal had shown no evidence of the disease except to give a typical reaction to johnin.

During the first year after the date of infection, this animal showed no evidence of disease whatsoever. During this year, all three animals were repeatedly tested with various preparations of johnin. The two animals already discussed reacted well when first tested, about four months after the infection date, and continued to react on other tests given about two months apart. J. D. 1, however, failed to react until the 13th month. Thereafter she reacted quite regularly to tests with johnin and avian tuberculin for about two and one-half years. During the latter part of her life, her behavior to these tests was rather erratic. Routine complement-fixation tests were begun about 18

months after the date of infection. The first two monthly tests were negative, but beginning in August, 1928, about 21 months after infection, the test became positive and remained so during the remainder of her life. The allergic tests, therefore, were positive nearly six months before complement-fixation, but fixation remained positive consistently during a long period when the allergic tests were inconclusive or negative.

The animal was bred in December, 1927, and calved normally in August, 1928, when she was about two and one-half years old, and about 21 months after the date of infection. She was noticed to be losing condition about six weeks later and, about ten weeks after calving, she began to scour badly and to emaciate

FIG. 2. The same animal two years after infection. The first period of scouring began shortly after this photograph was made. She had shown evidence of unthriftiness a month previously.

rapidly. Before the physical deterioration had been noticed, she was bred and again became pregnant. The initial scouring period lasted about three weeks. During the next two months, there was very little diarrhea but the emaciation continued, the hair-coat became very rough, the eyes became sunken because of the loss of post-orbital fat, and the animal ate little grain. A bit of mucosa pinched from the rectum showed nests of the acid-fast bacilli of Johne. During late spring, the animal began to eat grain, the scouring ceased, and there was considerable improvement in physical condition.

Late in July, 1929, when she was about three and one-half years old and about 43½ months after the date of infection, she gave birth to her second calf, a normal heifer. The afterbirth was retained and she was treated for several weeks for septic metritis, from which she recovered.

About four weeks after calving, a very profuse, fetid diarrhea began. This continued for six weeks, during which time the animal became so weak that she had to be assisted to rise when she got down. The rectum felt thickened and folded. Bits of mucosa, pinched out with the fingers, showed many Johne's bacilli. The animal was a very sorry sight, and it was daily

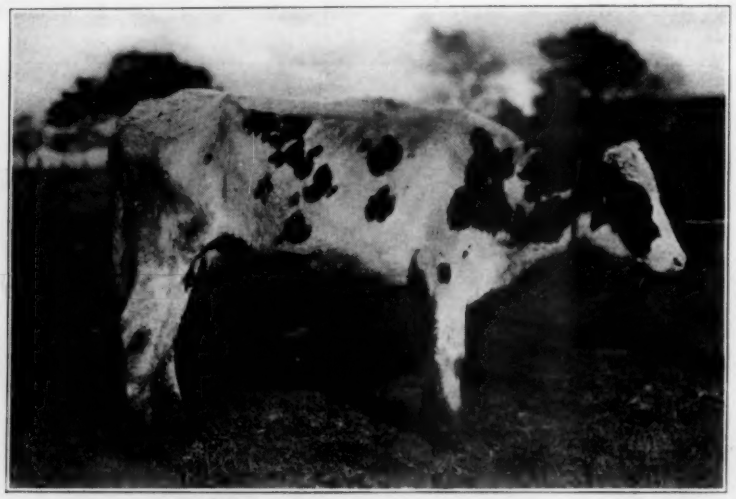

FIG. 3. The same animal three years after infection. She was entering her second period of scouring at this time and presented a typical picture of moderately advanced Johne's disease. A month later she was even more emaciated.

expected that her career would end. Her weight had fallen to 650 pounds, from a normal of about 1,100.

She now began to eat a little grain, the diarrhea stopped, and her strength rapidly returned. Within two weeks she looked very much better. Improvement continued without interruption. In less than six months, her weight had increased more than 600 pounds and within a year she weighed close to 1,350 pounds. She was as fat and sleek as an animal can be. Acid-fast bacilli were found in rectal scrapings on one occasion after her rapid improvement had begun. Several later examinations were negative. Throughout the remainder of her life, there were no further evidences of Johne's disease.

As the gestation period came to an end, it was found by rectal examination that she was carrying a mummified fetus. This was removed. A very fetid discharge flowed from the uterus for a few days. The pyometra was treated and eventually the condition was overcome. Although the genital organs appeared to be normal, and estrum appeared regularly, we did not succeed during the next three years in again getting her with calf.

In January, 1935, approximately five years after the final disappearance of symptoms of Johne's disease, a small portion of the lower end of the small intestine (ileum) was removed by

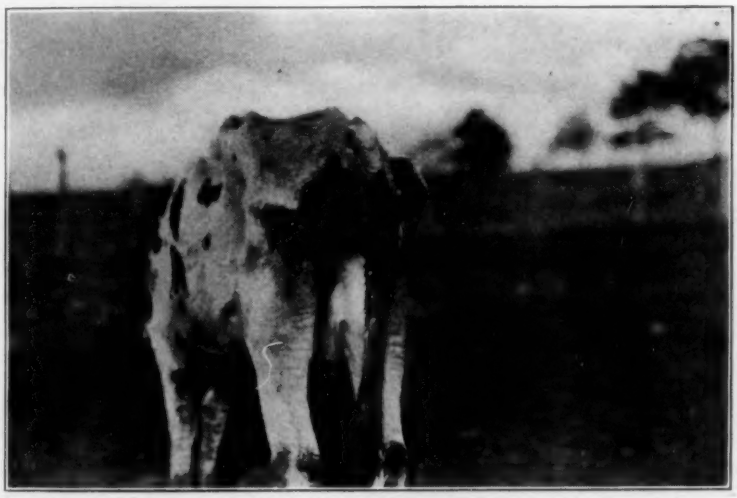

FIG. 4. Another view of the same animal taken at the same time as that in figure 3.

laparotomy. Acid-fast bacilli could not be found in this tissue nor could any histological evidence of the disease be found. We wondered if this animal had actually fully recovered from the disease. The clinical evidence certainly favored this view. On the other hand, the complement-fixation test had remained consistently positive, and on two of the ten routine semi-annual allergic tests administered during this period, once in 1931 and again in 1933, clear-cut, positive reactions were obtained. Furthermore, routine feces examinations, using a method which concentrated the acid-fast organisms, on several occasions dem-

onstrated small numbers of acid-fast organisms which could not be distinguished from those of Johne's disease.

It was decided to slaughter the animal. This was done in February, 1935, when she was slightly more than nine years of age, approximately eight and one-fourth years after the date of infection, six and one-fourth years after the time when the disease first manifested itself, and slightly more than five years since the last clinical evidence of the disease disappeared.

Autopsy Findings

The carcass was that of a well-nourished cow weighing nearly 1,400 pounds. The thoracic organs were normal except that

Fig. 5. A third view of the same animal taken at the same time as that in figure 3.

there were several calcareous plaques beneath the intima of the common aorta and the pulmonary artery near the valves. This lesion we have found to be a rather common one in Johne's disease.

An abscess 10 cm in diameter, heavily encapsulated and containing a thick, caseous, non-odorous pus, was found in the pelvic cavity. Both ovaries were involved in masses of adhesions. The liver, spleen and kidneys were normal.

The intestines externally appeared to be normal. The mesenteric, cecal and colic lymph-nodes showed no abnormalities that could be distinguished by gross examination. Portions of these

nodes were removed for sectioning and smears were prepared from them. The intestines were stripped out and opened throughout their entire length. In the middle of the cecum, an area of the mucosa, as large as a man's hand, appeared thickened, congested and folded. The remainder of the bowel presented nothing that would suggest the presence of Johne's disease.

Smears and sections were made at selected areas of the intestine from the duodenum to the rectum. The smears showed small numbers of the typical acid-fast bacilli in several of the mesenteric lymph-nodes. They were demonstrated also in the nodes that lie near the ileo-cecal valve, and in the cecal and colic

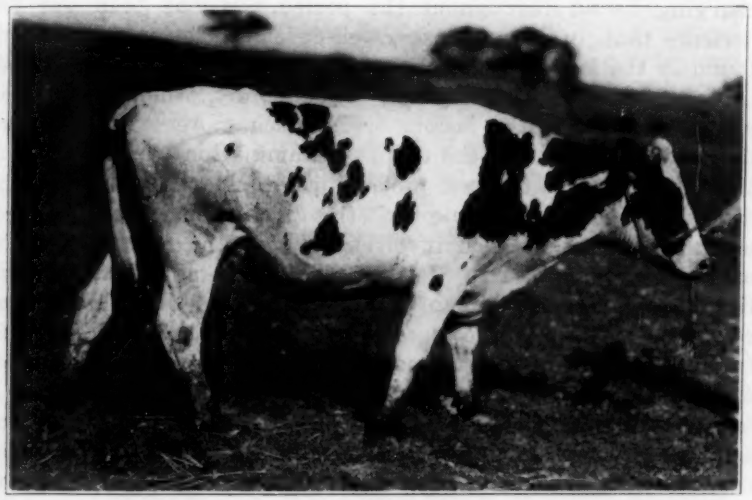

FIG. 6. The same animal three years and seven months after infection. At this time and until she was slaughtered nearly five years later, she showed no clinical evidence of Johne's disease.

nodes. The bacilli were scarce in the smears of the mucosa of the ileum, and were not found at all or demonstrated after considerable searching in the large intestine. The only area where considerable numbers of bacilli were found was that in the cecum where gross changes were evident.

The microscopic sections were stained with hematoxylin and eosin, and search was made for the lesions of Johne's disease.

Characteristic lesions of rather mild degree were found in one cecal and three mesenteric lymph-nodes. Several other nodes appeared to be entirely normal. Seven out of eight sections from the mucosa of the small intestine were normal; one showed a

few islands of epithelioid cells in the villi. The sections from the colon showed nothing but normal tissues. Only in the sections from the cecal patch, previously mentioned, were fairly marked lesions of Johne's disease found. Here the mucosa was greatly thickened because of the multiplication of epithelioid cells.

Discussion

A case is described in which the animal, after developing a typical and advanced form of Johne's disease, apparently recovered completely and remained well for more than five years. The autopsy examination showed, however, that the infection had not been eliminated and undoubtedly the animal had been discharging bacilli throughout the period. It has been our experience that, in clinical cases, well-developed lesions always are found in the lower end of the small intestine, in the cecum, and in the first part of the colon. Undoubtedly, when the disease was at its worst, the lesions were much more extensive than they were at the time the autopsy examination was held. Portions of the rectal mucosa, pinched out during the course of the disease, proved that at one time this portion had been involved, and no evidence of such involvement could be found when the animal was slaughtered. It is rather remarkable that the proliferations characteristic of this disease could be absorbed so completely as to leave no trace, but apparently this had happened in this animal. This leads, naturally, to the question of whether an animal may not completely recover from Johne's disease. It is not unreasonable to think that this animal might have done so, had she been allowed to live long enough. If an advanced case of the disease may occasionally recover, it is much more likely that exposed animals may often contract infections from which they may recover without reaching the advanced stage in which symptoms are produced.

Acknowledgments

We wish to acknowledge and express our appreciation of the assistance that has been given us at various times by Drs. W. M. Evans, D. W. Bruner, Ruth Gordon and L. J. Goss.

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There is nothing so easy but that it becomes difficult when you do it with reluctance.—Terence.

CULTIVATION OF SWINE PEST VIRUS IN TISSUE CULTURE. Friedrich Hecke. Abst. Arch. Path., xix (1935), 3, p. 432.

The author describes the successful cultivation of the virus of swine pest in tissue cultures. Drop cultures, made with the choroid plexus of young swine in swine plasma and extract of swine spleen, were infectious through 15 passages. Flask cultures with lymph-nodes were infectious through 20 culture generations. The flask cultures were maintained at 37° C. for 105 days, and the material was thereby diluted 10^{30}. Cultivation of the virus by means of kidney tissue did not succeed. The virus was demonstrable in control cultures at 37° C. without tissue up to 18 days. Transfer to other similar cultures resulted in loss of the virus in the second generation.

CULTIVATION OF THE VIRUS OF FOOT-AND-MOUTH DISEASE IN TISSUE CULTURES. Friedrich Hecke. Abst. Arch. Path., xix (1935), 3, p. 432.

The author succeeded in cultivating the virus of foot-and-mouth disease in tissue culture. The virus increased but slowly when the tissue culture contained very little tissue, but became larger in amount in the presence of larger amounts of tissue. The virus was present in higher concentration in the tissue than in the surrounding fluid, indicating that the increase in virus occurred in the tissue. The pH of the cultures dropped in from five to six days from 7.5 to 6.9 or less, during the time in which the virus was increasing, the highest concentration of virus being obtained at pH 6.9. The concentration of virus decreased at a lower pH, and below 6.3 could not be demonstrated. Death of the tissue caused a strong basic reaction and the destruction of the virus.

ANTIBODIES AGAINST TUBERCLE BACILLI AND A SPECIFIC THERAPY AGAINST TUBERCULOSIS. Guido Finzi. Abst. Arch. Path., xix (1935), 3, p. 442.

Lactating cows and horses were inoculated with a preparation of tubercle bacilli which was made in the following manner:

Tubercle bacilli were grown for from four to six weeks on peptone broth. The bacilli formed a pellicle on the surface. The broth was pipetted off and formed the so-called exotuberculin of Finzi. The pellicle of the bacilli remained on the walls. A 5 per cent solution of phenol in distilled water was added to the bacilli and the suspension was kept for from four to six weeks in the incubator, after which the bacilli were suspended in the exotuberculin. The animals were inoculated repeatedly with this antigen, first subcutaneously and then intravenously, until they developed, after from six to eight months, anti-tuberculous serums which were able to neutralize two or three diagnostic doses of exotuberculin *in vivo* and *in vitro*. Serum of normal healthy oxen and horses is able to neutralize one diagnostic dose of exotuberculin. The immune serums also had high titres of specific agglutinins (1:10,000 and more) and precipitins. The milk of the immunized cows had all the aforementioned properties of the blood serum. The titre of the antibodies in the milk dropped rapidly after the inoculations were discontinued. Finzi advocated the oral use of the milk of such immunized cows for therapeutic purposes. The antibodies were not destroyed in the digestive tract and were readily absorbed.

NUTRITIONAL EDEMA IN THE DOG. II. Hypoalbuminemia and the augmentation of tissue fluid. A. A. Weech, E. Goettsch and E. B. Reeves. Jour. Exp. Med., lxi (1935), 5, p. 717.

Pre-edematous fullness of the tissues is observed for some time before palpable edema develops. The transition from pre-edema to true edema is relatively sudden. Nutritional edema in 20 dogs required from 35 to 100 days for development. In general the weight curve does not rise during the transition from pre-edema to edema. However, the weight does increase rapidly when fluid is accumulating in the peritoneal cavity. The level of serum albumin which is critical for the development of edema varies between 1.04 and 2.17 gm per cent. Among 30 samples of edema fluid the protein concentration was from 0.02 to 0.72 gm per cent. A positive correlation is not demonstrable between the duration of edema and the protein content of the edema fluid. A difference in behavior toward fluid retention between subcutaneous tissue and peritoneal cavity is pointed out. Subcutaneous tissue is more resistant to acute stress than the peritoneal cavity. It is suggested that the critical level of protein in the serum is the concentration which permits the attainment in the tissue spaces of mechanical pressure great enough to break down

the restraining action of the connective tissue boundaries of the spaces.

THE RELATION OF LEUKOSIS TO SARCOMA OF CHICKENS I. Sarcoma and erythroleukosis (Strain 13). E. L. Stubbs and J. Furth. Jour. Exp. Med., lxi (1935), 5, p. 593.

A transmissible strain of sarcoma (strain 13) is described that took its origin in a chicken inoculated with the leukosis of strain 1. The virus of strain 13 produces sarcoma in the breast muscle injected with it and after intravenous inoculation it produced diffuse sarcomatosis of the spleen, bone-marrow and several other organs. The available evidence suggests that strain 13 is caused by a single virus with ability to produce diffuse endothelial growth in the blood-forming organs associated with extensive hematomata and erythroblastic proliferation. The strain can be readily transmitted by material free from live cells and preserved by drying. Amounts of blood as small as 0.00,001 cc from chickens with sarcomatosis of the internal organs transmit strain 13 by the intravenous route. By implantation sarcoma of strain 13 can be transferred to chickens that are resistant to repeated inoculations with leukotic viruses.

ENCEPHALOMYELITIS ACCOMPANIED BY MYELIN DESTRUCTION EXPERIMENTALLY PRODUCED IN MONKEYS. Thomas M. Rivers and Francis F. Schwentker. Jour. Exp. Med., lxi (1935), 5, p. 689.

The repeated intramuscular injections of aqueous emulsions and alcohol-ether extracts of sterile normal rabbit brains in some manner produced pathological changes accompanied by myelin destruction in the brain of seven of eight monkeys (*Macacus rhesus*). Eight control monkeys remained well. Cultures from the involved brains remained sterile and no transmissible agent was demonstrated by means of intracerebral inoculations of emulsions of bits of brain into monkeys, rabbits, guinea pigs and white mice.

THE EFFECT OF ULTRAVIOLET RADIATION ON THE OVA OF THE ASCARID ROUNDWORMS TOXOCARA CANIS AND TOXASCARIS LEONINA. W. H. Wright and E. D. McAlister. Smithsonian Misc. Coll., xciii (1934), 1.

Irradiation of the ova of *Toxocara canis* and *Toxascaris leonina* at measured wave-lengths resulted in a certain degree of radiotoxicity to the ova so exposed. A dosage of 27,400,000

ergs/cm^2 at a wave-length of 3022A resulted in a definite radio toxicity on the ova of both species of ascarids. Exposure to the same dosage at wave lengths of 3130 and 3650A showed no effect. In all tests, the ova of *Toxascaris leonina* proved more susceptible to the action of ultraviolet light than did the ova of *Toxocara canis*. This difference is accounted for by the difference in the structure and pigmentation of the shell. Although the marked lethal effect of sunlight on ascarid ova is probably due chiefly to desiccation and high temperatures, it would appear that the ultraviolet spectrum is in itself a factor under certain conditions in the destruction of such ova.

OBSERVATIONS IN THE LIFE HISTORY OF TOXASCARIS LEONINA (NEMATODA: ASCARIDAE). Willard H. Wright. Proc. Helminth. Soc. Wash., ii (1935), 1, p. 56.

Feeding experiments carried out with albino rats, mice, guinea pigs and dogs indicate that the larvae of *Toxascaris leonina* do not regularly migrate throughout the body of the host. There are four larval stages in the life history of this parasite. Ova of *Toxascaris leonina* maintained at a temperature of 30° C. in an atmosphere saturated with moisture contain vermiform embryos or first-stage larva on the second day of incubation and ensheathed infective embryos, or second-stage larvae, on the third day of incubation. Ova containing second-stage larvae are ingested by the host and usually hatch in the duodenum. The liberated larvae then penetrate the wall of the intestine from which they emerge about the ninth or tenth day after infection. Larvae of the third stage were recovered from the lumen of the intestine of a dog killed 14 days after infection. The fourth-stage larva molts to become an adult. Only occasionally in very heavy infestations do larvae penetrate the wall of the intestine and develop in the visceral organs.

ERYTHROCYTE PRODUCTION IN THE BONE MARROW OF THE PIGEON. Harvey Ernest Jordan and Edwin Peter Johnson. Amer. Jour. Hyg., lvi (1935), 1, p. 71.

Erythrocyte production in the bone-marrow was studied in pigeons after being fasted for ten days and then returned to normal feeding. Erythrocytogenesis was conspicuous in 18 hours following initial feeding and was then studied at two-hour intervals until the 50th hour. Erythrocytogenesis presented three chief aspects: (1) proliferation of persistent hemocytoblasts in

the peripheral sinusoids and their transportation to deeper venous channels; (2) proliferation of the stromal cells in the subendosteal area, their differentiation into hemocytoblasts which migrate into adjacent sinusoids where they develop into erythroblasts; (3) proliferation in subendosteal regions of lymphoid nodules which later develop into erythroblasts in the adjacent sinusoids. Extravascular hemocytoblasts differentiate into granulocytes. Granuloblasts and erythroblasts develop from the large hemocytoblasts; the smallest hemocytoblasts differentiate into thromboblasts. The endothelium of the sinusoids and venous capillaries is inert as regards erythrocytogenesis.

THE RELATION OF SOIL PROTOZOA TO TUBERCLE BACILLI. Chester Rhodes. Jour. Bact., xxix (1935), 4, p. 369.

Several methods were devised for conveniently and rapidly introducing pure cultures of protozoa, both ciliates and amoebae, into any pure culture of bacteria desired. A culture of *Colpoda Steinii* was introduced into a nutrient broth suspension of avian 531. The ciliate multiplied and was cultured thus for more than one year. Nutrient broth alone or the filtrate of a glycerol broth culture of avian 531 did not support growth of the ciliate. *Colpoda Steinii* and *Colpoda cuculus* do not destroy avian 531, as evidenced by plate-count studies. Some acid-fast bacteria support growth of *Colpoda Steinii;* others do not, a high degree of specificity being manifested. Strains revealed large numbers of acid-fast bacteria to be ingested by *Colpoda Steinii* and *Colpoda cuculus.* Several strains of soil amoebae failed to grow upon pure cultures of acid-fast bacteria. Excessive concentrations of acid-fast bacteria inhibit protozoa.

THE BEHAVIOR OF THE VIRUS OF EQUINE ENCEPHALOMYELITIS ON THE CHORIOALLANTOIC MEMBRANE OF THE DEVELOPING CHICK. Elizabeth Higbie and Beatrice Howitt. Jour. Bact., xxix (1935), 4, p. 399.

The virus of equine encephalomyelitis, both eastern and western strains, may be cultivated upon the chorioallantoic membranes of the developing chick. Inoculated upon the membranes of the egg, the virus may be recovered from the nerve tissues and the amniotic fluid of the embryo after a definite time interval. This progressive invasion is comparable with a growth curve ultimately leading to the death of the embryo. The virus could be recovered from the vitelline vein and from the pooled

heart-blood of several chick embryos after a definite incubation period. Because of the rapidly lethal effect of the virus upon the embryo, the inoculation of the developing egg offers a simple and inexpensive method for titrating the potency of the virus and for carrying out the *in vitro* neutralization test.

Tommy Graham Goes in for Herefords

That Dr. Ralph Graham (Iowa '04), U. S. B. A. I. inspector in charge of tuberculosis eradication, stationed at Jefferson City, Mo., has reason to be proud of his 17-year-old son, Tommy, in more ways than one, was pointed out in full-page article in the May issue of the *Hereford Journal.* The article says, among other things:

> For his age, Tommy Graham, Kaw City, Okla., is perhaps the most extensive Hereford breeder in the United States. Although only 17 years old, he is the owner of 50 head of registered Herefords. Not only does he own them, but also he takes care of them, keeps the records of the breeding and calving dates, and sends in to the Hereford Association at Kansas City the applications for registration.
>
> Tommy takes good care to see that his registered Herefords do not get the worst of it with his father's big herd of commercial Herefords, and when dad wants a bull out of Tommy's herd to use on his grade herd, he comes across with the cash on the barrel head just like any other buyer. Tommy not only is a good cowman, but also he is a business man. When he needs a new herd bull he goes out and buys it himself. Of course, he generally takes dad along and avails himself of his advice.
>
> As might be expected, Tommy is interested in 4-H club work. He is president of the 4-H Club in Kay County, and has been feeding and exhibiting calves for several years. He feeds calves of his own raising. He hasn't won any grand championships yet, but at the Oklahoma Junior Live Stock Show recently he landed a calf in fifth place. What with going to high school at Kaw City, five or six miles away, looking after his registered Herefords, feeding calves and helping out in the management of the commercial herd on his father's 15,000-acre ranch, Tommy is a fairly busy boy.

Dr. Graham settled in Oklahoma shortly after his graduation. He had been assigned to tick eradication with the U. S. B. A. I. force in that state and, while there, started raising cattle in a small way. His ranch now covers 15,000 acres and runs around 1,200 cows. Dr. Graham has been using high-class registered Hereford bulls for many years, most of them coming from the herd owned by the family of Dr. John A. Anstey (Iowa '05), of Massena, Iowa, good friend of Dr. Graham since their school days.

Truth is within.—BROWNING.

Regular Army

Major Mott Ramsey is relieved from duty at the Eighth Corps Area general depot, Fort Sam Houston, Texas, and assigned to duty at Jefferson Barracks.

Second Lt. Clarence L. Taylor is relieved from duty at Fort Hoyle, Md., effective in time to proceed to New York, N. Y., and sail on transport scheduled to leave that port for San Francisco, Calif., on or about July 30, 1935; upon arrival in San Francisco will report to the commanding general, San Francisco port of embarkation, for duty.

First Lt. Harvie R. Ellis is relieved from further assignment and duty as a student, the Cavalry School, Fort Riley, Kan., effective upon completion of his present course of instruction. and assigned to duty at Fort Riley.

Colonel Burt English, Fort Bliss, Texas, is directed to proceed to his home on or about July 7, 1935, and await retirement.

Veterinary Reserve Corps

New Acceptances

Anderson, Robert Jewell, Jr..2nd Lt...R. F. D. 3, Marshall, Texas
Bender, Jack Downing.....2nd Lt...2117 W. Ashwood Ave., Nashville, Tenn.
Corbin, Allen Edgar.....2nd Lt...2417 Deming Ave., Columbus, Ohio.
Couch, Weldon Morris.....2nd Lt...R. F. D. 4, Grandview, Texas.
Cox, Danford Lodge.....2nd Lt...R. F. D. 2, Willoughby, Ohio.
Dovre, Odin Esten.....2nd Lt...Minneota, Minn.
Evans, Lewis Ward.....2nd Lt...114 W. Frambes Ave., Columbus, Ohio.
Ewing, Robert Arthur.....2nd Lt...North Jackson, Ohio.
Fisherman, Henry .....2nd Lt...1400 Runnels St., Big Spring, Texas.
Fly, Glen Orahood.....2nd Lt...1826 E. 11th St., Indianapolis, Ind.
Gibson, Bernard Harrison...2nd Lt...Station B, R. F. D. 1, Columbus Ohio.
Herd, Dwight .....2nd Lt...East Liberty, Ohio.
Hesse, Charles Perry.....2nd Lt...Carroll, Ohio.
Ishee, Vaughn Eugene.....2nd Lt...Middlefield, Ohio.
Johnson, Edgar Stanley.....2nd Lt...R. F. D. 1, Elwood, Ind.
Lieberman, Leo Leibsch....2nd Lt...276 Mill Hill Ave., Bridgeport, Conn.
Long, Elmer Ira.....2nd Lt...202 South G. St., Wellington, Kan.
Mauney, Jacob Philo.....2nd Lt...204 Gaston Ave., Kings Mountain, N. C.

heart-blood of several chick embryos after a definite incubation period. Because of the rapidly lethal effect of the virus upon the embryo, the inoculation of the developing egg offers a simple and inexpensive method for titrating the potency of the virus and for carrying out the *in vitro* neutralization test.

Tommy Graham Goes in for Herefords

That Dr. Ralph Graham (Iowa '04), U. S. B. A. I. inspector in charge of tuberculosis eradication, stationed at Jefferson City, Mo., has reason to be proud of his 17-year-old son, Tommy, in more ways than one, was pointed out in full-page article in the May issue of the *Hereford Journal*. The article says, among other things:

> For his age, Tommy Graham, Kaw City, Okla., is perhaps the most extensive Hereford breeder in the United States. Although only 17 years old, he is the owner of 50 head of registered Herefords. Not only does he own them, but also he takes care of them, keeps the records of the breeding and calving dates, and sends in to the Hereford Association at Kansas City the applications for registration.
>
> Tommy takes good care to see that his registered Herefords do not get the worst of it with his father's big herd of commercial Herefords, and when dad wants a bull out of Tommy's herd to use on his grade herd, he comes across with the cash on the barrel head just like any other buyer. Tommy not only is a good cowman, but also he is a business man. When he needs a new herd bull he goes out and buys it himself. Of course, he generally takes dad along and avails himself of his advice.
>
> As might be expected, Tommy is interested in 4-H club work. He is president of the 4-H Club in Kay County, and has been feeding and exhibiting calves for several years. He feeds calves of his own raising. He hasn't won any grand championships yet, but at the Oklahoma Junior Live Stock Show recently he landed a calf in fifth place. What with going to high school at Kaw City, five or six miles away, looking after his registered Herefords, feeding calves and helping out in the management of the commercial herd on his father's 15,000-acre ranch, Tommy is a fairly busy boy.

Dr. Graham settled in Oklahoma shortly after his graduation. He had been assigned to tick eradication with the U. S. B. A. I. force in that state and, while there, started raising cattle in a small way. His ranch now covers 15,000 acres and runs around 1,200 cows. Dr. Graham has been using high-class registered Hereford bulls for many years, most of them coming from the herd owned by the family of Dr. John A. Anstey (Iowa '05), of Massena, Iowa, good friend of Dr. Graham since their school days.

Truth is within.—BROWNING.

Regular Army

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Long, Elmer Ira.....2nd Lt...202 South G. St., Wellington, Kan.
Mauney, Jacob Philo.....2nd Lt...204 Gaston Ave., Kings Mountain, N. C.

Morrison, Geo. Alexander....2nd Lt...3700 2nd Ave., N., Great Falls, Mont.
Morse, Joseph Ben.....2nd Lt...8923 Empire Ave., Cleveland Ohio.
Muniz, Charles Manuel.....2nd Lt...Trujillo St. 1, Ponce, Puerto Rico.
Nicholl, Elden Carrol.....2nd Lt...814 Prospect St., Amarillo, Texas.
Simonson, Earl Matzen.....2nd Lt...Hooper, Neb.
Smith, Claude Argyl.....2nd Lt...Fayette, Ohio.
Spangler, Harold Monroe....2nd Lt...Somerset, Ohio.
Thompson, William Moses...2nd Lt...R. F. D. 5, Winnsboro, Texas.
Tucker, Carl Conrad.....2nd Lt...Claypool, Ind.
Warnock, Robert Simpson....2nd Lt...307 W. 7th St., Aledo, Ill.
Whitehead, Jack Owen.....2nd Lt...Smith Point, Texas.

Separations

Muldoon, Wm. Edward.....Lt. Col...Peru, Ind. Died May 12, 1935.
Brown, Douglas Robert.....2nd Lt...Ennis, Texas. Died April 29, 1935.

New Jersey Ladies Organize

A Women's Auxiliary to the Veterinary Medical Association of New Jersey was organized at a meeting held at the Hotel Claridge, in Atlantic City, July 11, 1935. Twenty-two members were enrolled at this time. Annual meetings will be held in July, at the time of the annual meeting of the Veterinary Medical Association of New Jersey.

Officers chosen to serve during the coming year are: President, Mrs. Arthur W. Smith, West Orange; first vice-president, Mrs. Thomas Smith, Jersey City; second vice-president, Mrs. Charles J. McAnulty, Atlantic City; treasurer, Mrs. Douglas Harrison, Stockton; secretary, Mrs. Harry Ticehurst, Shrewsbury.

MRS. J. H. MCNEIL, *Reporter.*

Eastern Iowa Meeting Planned

Dr. Iva Dunn, president of the Eastern Iowa Veterinary Association, Inc., called a meeting of the Executive Board at Cedar Rapids on July 26, to discuss plans for the program of the twenty-second annual meeting of the Association, to be held at the Hotel Montrose, in Cedar Rapids, October 15-16, 1935. The literary program bids fair to be replete with informative papers on equine, bovine, ovine, swine, small-animal and poultry problems of practitioners, according to the Secretary, Dr. John J. Strandberg, of Belle Plaine.

AMERICAN VETERINARY MEDICAL ASSOCIATION

Resume of Minutes of Special Meeting of the Executive Board, Chicago, Ill., December 5, 1934

A special meeting of the Executive Board of the American Veterinary Medical Association was held at the Hotel La Salle, Chicago, Ill., Wednesday evening, December 5, 1934, at 7:30 p. m.

The following were in attendance: Dr. Cassius Way, Chairman and Member-at-Large; Dr. L. A. Merillat, District 3; Dr. C. A. Cary, District 4; Dr. F. F. Parker, District 5; Dr. L. M. Hurt, District 6; Dr. C. H. Hays, District 7; Dr. J. C. Flynn, District 8; Dr. H. W. Jakeman, District 9; Dr. O. V. Brumley, District 10; Dr. R. S. MacKellar, President; Dr. C. P. Fitch, Ex Officio; Dr. M. Jacob, Treasurer; Mr. Joseph M. Kotz, legal counsel; and Dr. H. Preston Hoskins, Secretary-Editor. Absent: Dr. A. E. Cameron, District 1; and Dr. E. P. Althouse, District 2.

1. The minutes of the annual meeting of the Board held in New York, N. Y., August 12-16, 1934, were read and approved.

2. For the purpose of deciding on an itinerary for President MacKellar, the Secretary read a list of the meetings to which invitations had been received. This list included three meetings that already had been held and which were attended by President MacKellar. The latter pointed out that the plan providing for the approval of the itinerary of the President by the Executive Board had proved to be impractical, due to the fact that it delayed definite acceptance of invitations until after the meeting of the Board. This, Dr. MacKellar further pointed out, interferes with the arrangement of programs by the secretaries of the associations extending the invitations. He recommended going back to the old plan of having the itinerary arranged by the Secretary and the President. A motion to this effect prevailed.

The Board approved the attendance of President MacKellar at the following meetings:

1935

January 3-4	Veterinary Medical Association of New Jersey.
January 8-9	Conference for Veterinarians at the University of Pennsylvania.
January 10-11	Annual Conference for Veterinarians at Cornell University.
January 16-17	Ohio State Veterinary Medical Association.
January 21-25	Michigan State College Short Course for Veterinarians.

January 22-24 Iowa Veterinary Medical Association.
February 7 Maryland State Veterinary Medical Association.
July 10-12 Joint meeting of the Virginia, Maryland and North Carolina associations and the veterinarians of the District of Columbia.

3. The Board approved the appointments of Dr. T. E. Munce, of Harrisburg, Pa., to the Committee on Veterinary Biological Products and Dr. Chas. H. Higgins, of New York, N. Y., to the Committee on Proprietary Pharmaceuticals, each for a term of five years.

4. Treasurer Jacob reported the status of the Salmon Memorial Fund bonds as about the same as at the meeting in New York. He stated that the receiver of the East Tennessee National Bank had taken advantage of his legal right and had appealed the decision of the District Court, rendered in favor of the A. V. M. A. An appeal had been filed and the case would next go to the Circuit Court and probably would be reached some time late in the spring of 1935.

Treasurer Jacob then reported on the financial condition of the Association and recommended the adoption of a resolution authorizing the exchange of any bonds owned by the Association, whenever the U. S. Treasury Department might call these bonds. A motion was passed, authorizing the Treasurer to make such exchange whenever it might be necessary, and the Secretary was authorized to formulate appropriate resolutions identifying any bonds that might be called.

5. The Secretary reported for the special committee appointed to work with Dr. L. A. Merillat in the preparation of his book, "The Veterinary Military History of the United States." The committee had been unable to arrive at any decision as to the best way of distributing the 500 copies of the book which would become the property of the A. V. M. A. under the agreement. A motion prevailed to discharge the old committee and provide for the appointment of a new one, to study the proposition further. (Committee appointed: Dr. H. Preston Hoskins, *Chairman;* Dr. M. Jacob and Dr. L. Enos Day.)

6. Dr. O. V. Brumley, chairman of the special committee appointed to consider the advisability of having a committee on publications, to work with publishers of veterinary books, made a report. It was decided to have a special committee for this purpose, which would function until such time as the By-Laws could be amended to provide for a standing committee. (Committee appointed: Dr. Oscar V. Brumley, *Chairman;* Dr. L. A. Merillat and Dr. C. A. Cary.)

7. Dr. L. A. Merillat, chairman of the special committee on dog foods, reported that it did not appear to be a feasible proposition for the A. V. M. A. to undertake the task of analyzing commercial dog foods, for reasons which were enumerated. The report was received and the committee discharged.

8. The Board then reviewed the cases of four veterinarians who had applied for membership in the A. V. M. A. but whose applications had been held up for one reason or another. Definite action was taken in each case.

9. Dr. C. P. Fitch, chairman of the special committee on advertising, stated that his committee had not been able to make any material progress in the matter of studying various forms of advertising employed by veterinarians. He recommended that the committee be discharged and a new committee appointed to study the matter further, and that the new committee have a larger representation of practitioners, in view of the fact that the problem to be studied is one that fundamentally concerns practitioners. (Committee appointed: Dr. E. P. Althouse, *Chairman;* Dr. J. C. Flynn, Dr. R. S. MacKellar, Dr. F. F. Parker, Dr. L. M. Hurt and Dr. H. W. Jakeman.)

10. The Secretary reported the case of a member of the A. V. M. A. who had taken the necessary legal steps to have his name changed. As this was the first case of its kind, as far as the A. V. M. A. was concerned, and as it involved the alteration of certain records, the Secretary asked for instructions. Mr. Kotz recommended the procedure that should be followed in all such cases and the Secretary was so instructed.

11. A motion prevailed to discharge the special committee which had been appointed to study the recommendations contained in the presidential address of Dr. N. F. Williams.

12. The Secretary presented an application for the installation of a student chapter of the A. V. M. A. at the New York State Veterinary College at Cornell University. The Board duly approved the application.

13. The Board approved the nomination of Mr. Henry T. Jeffers, president of the Walker-Gordon Laboratory Company, of Plainsboro, N. J., for honorary membership in the A. V. M. A.

14. The Secretary read some correspondence from the San Diego County Veterinary Medical Association, in which that organization offered to sponsor an exhibit of the American Veterinary Medical Association at the California Pacific International Exposition, to be held in San Diego in 1935. Dr. L. M. Hurt explained certain details of the proposition to the members of the Board. The Secretary reported that it would not be possible to

figure on the dioramas which had been on display at A Century of Progress in Chicago, during the summer of 1934, as these had been loaned to the Museum of Science and Industry, in Chicago, for a period of two years. A notion prevailed, leaving the matter in the hands of Dr. Hurt and the Secretary.

15. The Secretary reported that the A. V. M. A. had taken over the administration of the Student Loan Fund of the Women's Auxiliary. He reported that there were sufficient funds on hand to meet all requests for loans that had been made up to that time, as a result of which it had not been necessary to take advantage of the appropriation made available by the Association. The Secretary stated further that it did not appear advisable to develop the plans for the Student Loan Fund any further, until such time as the Association secures physical possession of the bonds of the Salmon Memorial Fund now in litigation.

16. The amendments to the Constitution and By-Laws recommended to the House of Representatives at the New York meeting, having been approved and referred back to the Executive Board, were then discussed at considerable length. A motion prevailed, authorizing the Secretary and Mr. Kotz to put the four amendments in proper form for action at the meeting in Oklahoma City. The amendments provided (1) for adding to the list of standing committees a committee on public relations; (2) for admitting to active membership persons other than veterinarians but holding a doctorate degree in either medicine, science or philosophy; (3) for having the President of the A. V. M. A. act as chairman of the House of Representatives *ex officio*, and (4) for the House of Representatives nominating three candidates for President each year, these to be voted on by mail ballot, or electing a President-elect at each annual meeting.

17. The Secretary then reported on applications that had been received for the position of assistant to the Secretary-Editor, following the meeting in New York. A motion prevailed, authorizing the chairman of the Board to appoint a special committee to give the matter further consideration and with full power to act. (Committee appointed: Dr. Cassius Way, *Chairman;* Dr. R. S. MacKellar, Dr. M. Jacob and Dr. H. Preston Hoskins.)

18. A motion prevailed empowering the chairman of the Board to appoint a special committee to study the communication addressed to all members of the Board by Dr. R. J. Garbutt, of New York, N. Y. (Committee appointed: Dr. Cassius Way and Dr. R. S. MacKellar.)

19. Dr. C. C. Hisel, of Oklahoma City, Okla., presented himself before the Board, for the purpose of making recommendations

concerning dates for the 1935 meeting to be held in Oklahoma City. Dr. Hisel recommended the last week in August. A motion prevailed definitely fixing the dates for the meeting as August 27-28-29-30, 1935.

20. A motion prevailed authorizing Mr. Kotz to attend the meeting of the Executive Board in Oklahoma City, for the purpose of advising the Executive Board in connection with all legal matters, amendments to the Constitution and By-laws, and so forth.

21. A motion prevailed that the expenses of the members of the Board, incurred in attending this meeting, be paid by the A. V. M. A. in those cases where these expenses were not otherwise provided for.

Adjournment.

H. PRESTON HOSKINS, *Secretary.*

Oklahoma City Meeting Gets Publicity

A front-page editorial on the A. V. M. A. meeting in Oklahoma City, August 27-30, was featured in the *Oklahoma Live Stock News* for July 10, 1935. The editorial points out that:

> The magnitude of the meeting itself will be of considerable import to Oklahoma City and to the state. The Committee on Local Arrangements, which has been busy for fully six months, is preparing for an attendance of more than 1,500, which will include top officials in the U. S. Bureau of Animal Industry and prominent figures in all phases of the live stock industry, as well as national authorities in the field of veterinary medicine. It will be an unexcelled opportunity to impress comers from all parts of the nation with Oklahoma's opportunities and progress in live stock production.
>
> Just as the National Live Stock Exchange convention in Oklahoma City, in 1934, opened the eyes of live stock market men to the value of the Oklahoma City market and the offerings of Oklahoma stockmen, so will the coming convention raise the prestige of Oklahoma in the eyes of another division of the live stock industry.

Members of the A. V. M. A. are assured of a cordial welcome to Oklahoma by the live stock industry of that state.

Kansas Graduates Three More

Three candidates for the degree, Doctor of Veterinary Medicine, were presented by Dean R. R. Dykstra, of the Division of Veterinary Medicine, Kansas State College, at the close of the eleventh annual summer session, July 26, 1935: John Englen Mouw, Charles Frank Prchal and Alfred E. White, Jr.

NEW YORK STATE VETERINARY MEDICAL SOCIETY

The forty-fifth annual meeting of the New York State Veterinary Medical Society was held at Binghamton, June 13-14, 1935, and was one of the best attended and most interesting meetings the Society has held in years.

Dr. A. E. Merry, of Syracuse, called the meeting to order and gave the presidential address. He referred to the many changes in the veterinary field since the advent of the automobile and emphasized the varied opportunities for veterinarians today with new fields opening constantly for them. He also recommended that a bill be put through the State Legislature for better meat and milk inspection. To effect a closer relationship between the veterinary profession and the public, he suggested that a resolution be adopted and a committee appointed to foster such a relationship.

Dr. O. E. McKim, of Port Chester, presented an instructive paper on "Homologous Blood, Its Uses and Products," which was discussed at length by Dr. N. J. Pyle, of Pearl River. Dr. W. A. Hagan, of the New York State Veterinary College, read a paper on "The State Veterinary College, the Veterinary Profession and the Live Stock Owner," which was so well received that a motion was passed to have reprints made and mailed to all members.

Following reports by several of the committees, the question arose regarding a possible influx of women veterinarians, now enrolled in foreign colleges, to enter practice in this country. After a discussion, a motion was passed that the educational law be amended to read: "A person must be a citizen of the United States to be admitted to examination for a license to practice veterinary medicine."

The question of admitting to membership in the A. V. M. A. persons outside the veterinary profession also came up for discussion. In this connection a motion was passed that the delegate from the New York Society to the A. V. M. A. House of

Representatives be instructed to vote against admitting others than veterinarians to membership in the A. V. M. A.

At the afternoon session, Prof. F. B. Morrison, of the Department of Animal Husbandry, Cornell University, spoke interestingly on "Recent Developments in Live Stock Feeding." Dr. G. H. Hewett, of Albany, gave an able discussion of this topic. He was followed by Dr. Carl TenBroeck, of the Rockefeller Institute, Princeton, N. J., whose subject was "The Relationship of Human and Veterinary Medicine." Dr. TenBroeck compared the two professions, urging a closer relationship and showing how this could be accomplished. Dr. Hagan discussed the paper. Mr. John Hogan, of Binghamton, discussed "Income Tax" and how it affects the veterinarian. He pointed out that keeping the necessary records may be a simple affair, if the veterinarian will keep account of his receipts and expenses during the year, under the different headings. At the close of the year, all he has to do is to total the column and deduct expenses from receipts to show his net profits.

Dr. J. L. Wilder, of Akron, read a splendid paper on "Horsemanship," in which he pointed out that it was essential for the veterinarian to be a good horseman. Dr. Cassius Way, of New York City, gave an interesting talk, illustrated by lantern-slides of x-ray pictures, on "Lameness in Horses Due to Chronic Arthritis," and suggested a new and humane line of treatment.

Clinics were held on the morning of the second day. The clinics were held at the country home of Dr. M. C. Markham, and consisted of the following operations and demonstrations: Dr. J. L. Wilder, of Akron, performed an operation on a cryptorchid colt. Dr. F. E. McClelland, of Buffalo, demonstrated epidural anesthesia on a dog for a tail operation. Dr. H. S. Beebe, of Albion, successfully removed a shoulder tumor from a horse. A constantly drooling Pekingese dog, presented for examination, revealed diseased and loose teeth. Dr. W. L. Gilbert, of Cobleskill, operated on a horse for poll-evil. A Jersey bull was presented, having raised areas six by eight inches on both sides of the back just anterior to the lumbar vertebrae. A year ago, the bull had depressions at these points and they were filled with wax. A prognosis was not given.

Dr. J. V. Lacroix, of Evanston, Ill., demonstrated dental anesthesia on a dog for chiseling out molars. He first gave the dog 0.5 grain of morphine, then 3.5 cc of nembutal intravenously, following which he used 5 cc of a 2 per cent solution of procaine, blocking the nerves of both upper and lower jaws. He also demonstrated the entropion operation on the same dog. Dr. C. P.

Zepp, of New York City, used the same dog for a similar operation. Dr. Way demonstrated the use of the x-ray and fluoroscope in diagnosing foot and leg ailments. Other demonstrations included one for foreign bodies in a cow. The cow was later operated on by Dr. James H. Howard, of Binghamton, who recovered the foreign body, in this case a nail. A draft horse was presented with chronic infectious pododermatitis. Dr. M. G. Fincher, of Ithaca, removed a diseased molar from a pony. Demonstrations of the intravenous injection of a 7 per cent solution of chloral hydrate were given.

Considerable discussion took place on the subject of iliegal practice. No definite action was taken by the Society at this time, but the Executive Board has arranged to follow up one or two cases and prosecute if necessary. Following a report by the Committee on Physical Examinations, the Society voted to adopt the following rates: A minimum charge of $2 for the first ten head, and 15 cents per head for each additional animal. Charges for reëxaminations are to be made on the same basis. Other reports were made by the Executive Board, the Committee on Radio, the Committee on Mastitis, the Committee on Resolutions, the Committee on Meat Inspection and the Committee on Affiliation of Associations.

The annual banquet was held at the Arlington Hotel. President Merry, as toastaster, introduced Hon. C. A. Harrell, city manager of Binghamton, who welcomed the Society to the city. The response was given by the Vice-President, Dr. H. V. Baker, of Hamburg. Dr. R. S. MacKellar, president of the A. V. M. A., was the guest of honor. He spoke on "The Activities of the A. V. M. A.," and urged all members of the Society to attend the meeting at Oklahoma City in August. Dr. J. G. Wills, of Albany, representing Commissioner Peter Ten Eyck, spoke briefly. Dr. J. V. Lacroix, of Evanston, Ill., and Dr. F. E. Smith, of Seattle, Wash., also spoke.

Officers elected to serve for the coming year are: President, Dr. H. V. Baker, Hamburg; vice-president, Dr. C. P. Zepp, New York; treasurer, Dr. C. E. Hayden, Ithaca. Dr. M. C. Markham was elected to the Executive Board, succeeding Dr. J. G. Wills, whose term expired recently. The Society nominated six members, one of whom will be appointed to the Board of Regents: Dr. J. K. Bosshart, Camden; Dr. David Hoyt, Canastota; Dr. Frank McBride, Tonawanda; Dr. Harry G. Hodges, Ridgewood, N. J.; Dr. John Miller, Albany; Dr. R. W. Gannett, Brooklyn.

F. F. FEHR, *Executive Secretary.*

ARKANSAS VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Arkansas Veterinary Medical Association was held at the Hotel Marion, Little Rock, June 14, 1935, and was one of the largest and most interesting meetings in the history of the Association.

The meeting was called to order by the President, Dr. Walter Martin, of Jonesboro. The literary program was opened with a paper by Dr. T. M. Dick, of Little Rock, on "City Meat Inspection." Dr. Hubert Shull, of Texarkana, and Dr. Earle L. Kittrell, of Augusta, led the discussion on this subject. The next paper was on "The Duties of a Practitioner to His Client," by Dr. R. W. Williams, of El Dorado. It was discussed by Dr. P. A. Johnson, of Little Rock, Dr. J. C. Young, of Marianna, and Dr. Hugh Puckett, of Little Rock. Another subject of special interest was that presented by Dr. J. D. Morton, of Little Rock, on "The Technic of Pullorum Testing, and the Rapid Tube Method in Bang's Disease Testing." Interesting discussions were contributed by Dr. W. L. Bleecker, of the University of Arkansas, Dr. X. G. May, of Fort Smith, and Dr. I. Peters, of Fordyce. Dr. Hubert Shull spoke on "Milk Grading and Dairy Sanitation," which was discussed by Dr. J. N. Jerome, of Wilson, Dr. C. W. Hayes, of Russellville, and Dr. E. B. Mount, of Memphis, Tenn.

The honor guest, Dr. C. C. Hisel, State Veterinarian of Oklahoma, was next presented, and spoke of the need for and value of coöperation between practicing veterinarians and government and state officials in the eradication of Bang's disease and tuberculosis. He was followed by Dr. Rease Mitcham, of Little Rock, who presented the subject of "The X-Ray in Practice," which was discussed at length by Dr. F. R. Osborn, of Little Rock, and Dr. J. F. Stanford, of Fayetteville. The final paper was given by Dr. R. O. Porter, of the U. S. Bureau of Animal Industry, Little Rock, and was entitled "The Eradication of Bang's Disease." The discussions were closed by Dr. O. D. Campbell, of Warren, Dr. E. D. Wineland, of Barber, and Dr. E. P. Niles, of Mammoth Springs.

In the business session that followed the program, the Association voted to affiliate with the American Veterinary Medical Association. Dr. C. D. Stubbs, of Little Rock, was named delegate to the A. V. M. A. House of Representatives, and Dr. R. W. Williams, of El Dorado, was named as alternate. The day came to a close with a delightful banquet, which was attended by the ladies. At this time, the ladies decided to organize a Women's Auxiliary to the Arkansas Veterinary Medical Association.

Officers who will serve during the coming year are: President, Dr. O. A. Barber, Helena; vice-president, Dr. R. O. Porter, Little Rock; secretary-treasurer, Dr. T. M. Dick, Little Rock.

T. M. DICK, *Secretary.*

NEBRASKA STATE VETERINARY MEDICAL ASSOCIATION

The second annual clinic of the Nebraska State Veterinary Medical Association was held in the barn of Dr. S. W. Phillips, at David City, June 27, 1935. More than 150 veterinarians attended the clinic from every section of Nebraska and surrounding states. Some 35 head of horses and mules, 25 head of cattle, and a number of hogs, dogs and cats, brought from various parts of the state, were available as clinical material. Operations and demonstrations began early in the morning and continued throughout the day, with several operations in progress at the same time. For the benefit of those who could not get close to the scene of operation, a loud speaker had been installed in the rear of the barn, through which the operations were described. An x-ray machine was also in use at the clinic.

Entertainment for the visiting ladies and children, 85 in number, was supplied in the form of a picnic dinner at City Park and bridge in the afternoon. Mrs. S. W. Phillips, assisted by Mrs. H. Gross, was hostess.

Credit for the success of the clinic is due largely to the efforts of the Clinic Committee, composed of Dr. Phillips, Dr. R. C. Gilmore, of Ulysses, Dr. W. H. Boyle, of Schuyler, and Dr. B. F. Lott, of Gresham. Dr. Gilmore was in charge of the section on horses; Dr. Lott planned the program for the section on cattle, and Dr. Boyle had charge of the section on swine and small animals.

On the evening preceding the clinic, an open meeting was held at the David City Commercial Club for the discussion of matters of interest to the Association.

B. F. LOTT, *Reporter.*

GENESEE VALLEY VETERINARY MEDICAL ASSOCIATION

The summer meeting of the Genesee Valley Veterinary Medical Association was held at the "Willowbrook" farm of Dr. F. L. Stein, near Rochester, N. Y., July 10, 1935.

Several clinical cases were presented. The first was that of a cow with a skin irritation, presented by Dr. J. E. Smith, of Webster, N. Y. Similar cases had been described previously by Dr. D. H. Udall, of the New York State Veterinary College, and ascribed to light sensitization, clover or buckwheat disease. The cow in question was of a brown and white color. The white areas had sloughed, but the brown areas were untouched. Discussion of the case disclosed a variety of opinions before it was finally diagnosed. Dr. J. L. Wilder, of Akron, N. Y., demonstrated the spaying of two mares with cystic ovaries and did a masterful piece of work. Dr. Stein spayed a puppy and performed an operation for early pyometra. A low femur fracture in a male pup was then presented and the fracture reduced and splinted. The question of the use of certain splints requiring traction, with reference to injury to the stifle joint, was discussed. Two of the listeners expressed the opinion that rather severe traction over a period of time might lead to an ankylosis of the stifle joint. Opinions on this subject will be welcomed by the members of the Association.

The clinic was followed by a discussion of an influenza-like disease in horses, given by Dr. Charles M. Carpenter, of the Strong Memorial Hospital, Rochester. Many of the practitioners present had observed cases similar to those described by Dr. Carpenter, but had treated them symptomatically, being unable to specify the direct cause of the disease. Dr. Carpenter said that there were a number of diseases that had to be treated symptomatically, since the etiological factor had not been isolated. He pointed out also that there might be a correlation between horse, swine and human influenzas. He then gave a résumé of recent work on thymus gland extract, and described the possibilities of such research.

Dr. E. G. Baxter, of Webster, N. Y., who had recently diagnosed several cases of *Trichomonas vaginalis* infection in cattle, spoke of his work along this line. The disease is not common, there being only a few herds affected in New York State. The next feature of the program was a postmortem examination of a dog that had died of an acute enteritis after an x-ray had shown a foreign body with sharp edges on both sides. The sharp edges proved to be shadows, and the severe bloody diarrhea was due to the enteritis and not to the foreign body itself. The smooth stone found in the stomach had caused insignificant changes, death being due to the enteritis, mainly in the upper bowel, and a severe hemorrhage in the omentum, glands and bowel. Follow-

ing the meeting, dinner was enjoyed at the Blarney Stone Inn, after which moving pictures of surgical operations were shown through the courtesy of the Eastman Kodak Company. The pictures had been taken with the new Kodachrome film. The operations were explained by members of the staff of the Strong Memorial Hospital.

The ladies were entertained by a capable committee and spent a pleasant afternoon.

L. J. DESSON, *Secretary.*

NORTH DAKOTA VETERINARY ASSOCIATION

The thirty-first annual meeting of the North Dakota Veterinary Association was held at the North Dakota Agricultural College, at Fargo, June 20-21, 1935. The attendance of North Dakota veterinarians and visitors exceeded 40 in number. The meeting was successful from every standpoint. The discussions were interesting, the questions well considered, and the comments entirely favorable. Dr. W. D. Odou, of Hettinger, presided throughout the meeting.

A number of excellent papers were presented. Dr. W. L. Boyd, of the University of Minnesota, had as his subject, "The Cyanide Problem in Farm Animals." Drs. J. F. Hinz, of Lidgerwood, N. Dak., O. I. Catlin, of Moorhead, Minn., and G. S. Harshfield, of the North Dakota Agricultural College, discussed "Our Experience with a Disease Simulating Encephalomyelitis." The subject was illustrated with a film supplied by the Hooper Foundation, of the University of California. Drs. C. H. Hofstrand, of Churchs Ferry, L. R. Montgomery of Casselton, and J. W. Dunham, of Fargo, discussed "Equine Anthelmintic Treatment." Dr. Hofstrand also demonstrated his technic in using the stomach-tube. A paper on "The Poisonous Plants of North Dakota," by Prof. O. A. Stevens, of the North Dakota Agricultural College, provoked many thoughtful questions. Dr. R. E. Shigley, of Kenmare, presented a paper on "Irregular Blackleg," which was discussed by Dr. B. K. Bjornson, of Fargo. Dr. A. M. Brolling, of the U. S. Bureau of Animal Industry, at Fargo, demonstrated the technic of the intradermal tuberculin test. The program was concluded with an informal discussion of the organization, methods, progress, and results of the work now in progress on Bang's disease control.

Officers were elected for the coming year as follows: President, Dr. R. R. Cusack, Jamestown; vice-president, Dr. A. M. Brolling, Fargo; secretary-treasurer, Dr. Lee M. Roderick, Fargo.

LEE M. RODERICK, Secretary.

VIRGINIA STATE VETERINARY MEDICAL ASSOCIATION

The forty-second annual meeting of the Virginia State Veterinary Medical Association was held at Richmond, July 10-12, 1935. The Virginia Association was host to the associations of Maryland, West Virginia, South Carolina, North Carolina and the veterinarians of the District of Columbia. More than 400 veterinarians and their ladies were registered for the three-day session.

Of particular interest were the symposia on diseases of dogs and equine encephalomyelitis. The clinic was exceptionally good, both from the standpoint of the demonstrators and the material available.

Officers named to serve during the coming year are: President, Dr. I. D. Wilson, Blacksburg; first vice-president, Dr. I. P. Gilbert, Courtland; second vice-president, Dr. L. K. Spitler, Luray; secretary, Dr. A. J. Sipos, Richmond; treasurer, Dr. R. E. Brookbank, Richmond.

The Virginia State Board of Veterinary Medical Examiners held an examination on July 10, which was taken by seven applicants.

A. J. SIPOS, *Secretary.*

NORTH CAROLINA STATE VETERINARY MEDICAL ASSOCIATION

The thirty-fourth annual meeting of the North Carolina State Veterinary Medical Association was held in Richmond, Va., July 10-12, 1935, as a joint affair with the state associations of Virginia, West Virginia and Maryland, and the veterinarians of the District of Columbia. The attendance from North Carolina consisted of 45 veterinarians and approximately 20 ladies.

Dr. P. M. Abernethy, president of the North Carolina Association, presided at the morning session on July 11. Appearing on the program from North Carolina were Dr. M. M. Leonard, of Asheville, who discussed "Canine Distemper," and Dr. Wm. Moore, of Raleigh, who discussed "Federal Control of Bang's Disease." At the business session, an amendment to the By-laws was proposed which would raise the dues of the members from $3 a year to $10. This will be voted on at the 1936 meeting. A committee was appointed to consider an appropriate seal for the Association. The report of the Secretary-Treasurer showed that, at this time, there are 96 veterinarians in North

Carolina, 71 of whom belong to the state association. There are 76 general practitioners, 19 veterinarians engaged in federal, state or municipal work and one engaged in teaching.

Officers elected for the coming year are: President, Dr. W. A. Carter, Weldon; first vice-president, Dr. N. B. Tyler, Raleigh; second vice-president, Dr. A. E. Brannock, Lexington; secretary-treasurer, Dr. J. H. Brown, Tarboro (reëlected); directors, Dr. H. Calvin Rea, Charlotte, and Dr. R. E. Taylor, Hendersonville. At a previous meeting, Dr. A. A. Husman, of Raleigh, was elected a delegate to the A. V. M. A. House of Representatives, and Dr. Wm. Moore was elected alternate. Goldsboro was chosen as the meeting place for 1936.

Officers elected by the Ladies' Auxiliary are: President, Mrs. Wm. Moore, Raleigh; vice-president, Mrs. J. I. Neal, Sanford; secretary-treasurer, Mrs. G. A. Ferguson, Leaksville.

J. H. BROWN, *Secretary.*

HOUSTON VETERINARY ASSOCIATION

The July meeting of the Houston (Texas) Veterinary Association was held at the Port City Packing Company, Houston, on the 11th. In the absence of the Secretary, Dr. T. A. Ward, the President appointed Dr. J. G. Horning to serve temporarily. The meeting was called to order following a sumptuous dinner at which the "pièce de résistance" was sweetbreads.

The President, Dr. Archie Stallings, read articles from several newspapers to show the propaganda that is being issued against rabies vaccination by the Houston S. P. C. A. Dr. W. T. Huffnall presented a report on the proper length of quarantine when a dog has been exposed to rabies. It was his opinion that the quarantine period should be not less than six months. All others present concurred in this opinion.

Dr. Don B. Strickler, who succeeded Dr. Charles Horcher as local B. A. I. inspector-in-charge, made a short talk, and applied for membership in the Association. Dr. "Big Boy" Smotherman suggested newspaper advertising of a list of the members of the Association as registered and graduate veterinarians, to combat the numerous quacks who are invading the local professional field. Although considered worth while, the suggestion was disapproved by Drs. James and Horning on the ground that it conflicted with the ethics of the profession.

It was decided to hold the next meeting at the Sanitary Dairy Products Plant.

J. GILBERT HORNING, *Acting Secretary.*

MARYLAND STATE VETERINARY MEDICAL ASSOCIATION

The semi-annual meeting of the Maryland State Veterinary Medical Association was held at Richmond, Va., July 10-12, 1935, in conjunction with the state associations of Virginia, West Virginia and North Carolina and the veterinarians of the District of Columbia.

A short business session, the evening of July 10, was called by the President, Dr. F. S. Wharton, of Centerville, at which Dr. E. B. Simonds, of Berwyn, was appointed as a delegate to the A. V. M. A. House of Representatives at Oklahoma City in August. Certain instructions were given the delegate concerning the amendment to admit others than veterinarians to membership in the A. V. M. A., and concerning the action to be taken on the report of the Committee on Education. The activities of the Ladies' Auxiliary were discussed at some length, with a view to strengthening the organization and increasing its membership. The Secretary-Treasurer was instructed to communicate with the officers of the Auxiliary and to offer any financial or other assistance that might be needed to promote their work.

The rest of the time was devoted to attendance at the sessions of the three-day program planned jointly with the other participating associations.

MARK WELSH, *Secretary.*

KENTUCKY VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Kentucky Veterinary Medical Association was held at the Brown Hotel, Louisville, July 10-11, 1935, with a good attendance. The meeting was called to order by Dr. F. E. Hull, of Lexington, First Vice-President, who presided over the meeting in the absence of the President, Dr. George W. Pedigo, of Glasgow.

The morning session was devoted to a round-table discussion of the control and eradication of Bang's disease and mastitis. This discussion was led by Dr. D. E. Westmorland, State Veterinarian, and Dr. W. F. Biles, of Frankfort. Dr. Westmorland called on several federal veterinarians to give their experiences and recommendations regarding the eradication of Bang's disease and mastitis. Several private practitioners also expressed their views, and it was the general opinion that the eradication of these two diseases was progressing very favorably.

The afternoon program was featured by two papers and the business session. Dr. W. W. Dimock, of Lexington, spoke on "Equine Breeding Hygiene," and Dr. A. J. Kay, of Frankfort,

read a paper prepared by Dr. Frank Hare, of Lexington, on "Anaplasmosis of Cattle."

The speakers on the second-day program were Dr. J. A. Winkler, of Newport, who gave an excellent paper on "Gastro-enteritis as a Sequel to Secondary Infection in Canine Distemper," and Dr. T. W. Munce, of Sioux City, Iowa, who presented a paper on "Swine Erysipelas," which gave many helpful hints on the treatment of this disease. Dr. Munce took an active part in all discussions and was a valuable contributor to the success of the meeting.

Mr. E. E. Pendergrass, an attorney of Louisville, gave an interesting paper on "Legal Aspects of Veterinary Practice." Dr. H. J. Metzger, of Lexington, presented an instructive paper on "Nutrition," which was followed by a general discussion of grass tetany, apparently a new disease that was quite prevalent in Kentucky during the spring months. Dr. C. E. Hagyard, of Lexington, presented a splendid paper on "Equine Encephalomyelitis."

Officers elected for the coming year are: President, Dr. F. E. Hull, Lexington; first vice-president, Dr. A. S. Barnes, Frankfort; second vice-president, Dr. John Baird, Lexington; secretary-treasurer, Dr. E. A. Caslick, Paris. One new member, Dr. H. J. Metzger, of Lexington, was admitted. Dr. E. Calldemeier and his son, Dr. Houston A. Calldemeier, of Louisville, were elected delegate and alternate, respectively, to the A. V. M. A. House of Representatives at Oklahoma City.

E. A. CASLICK, *Secretary.*

VERMONT VETERINARY MEDICAL ASSOCIATION

The midsummer meeting of the Vermont Veterinary Medical Association was held at the Hotel Coolidge, White River Junction, July 12-13, 1935.

The meeting was called to order by the President, Dr. N. H. Tenney, of White River Junction, and the following literary program was presented:

"Bang's Disease: Field and Laboratory," by Dr. A. F. Ranney, Director of Laboratory, Montpelier.

"Bang's Disease: Vermont Laws and Regulations," by Dr. L. H. Adams, U. S. B. A. I. Inspector-in-Charge, Montpelier.

"Mastitis," by Dr. Elmer A. Woelffer, Hood & Son Milk Farms, Charleston, Mass.

"Hemorrhagic Septicemia," by Dr. K. M. Kennedy, Waterbury.

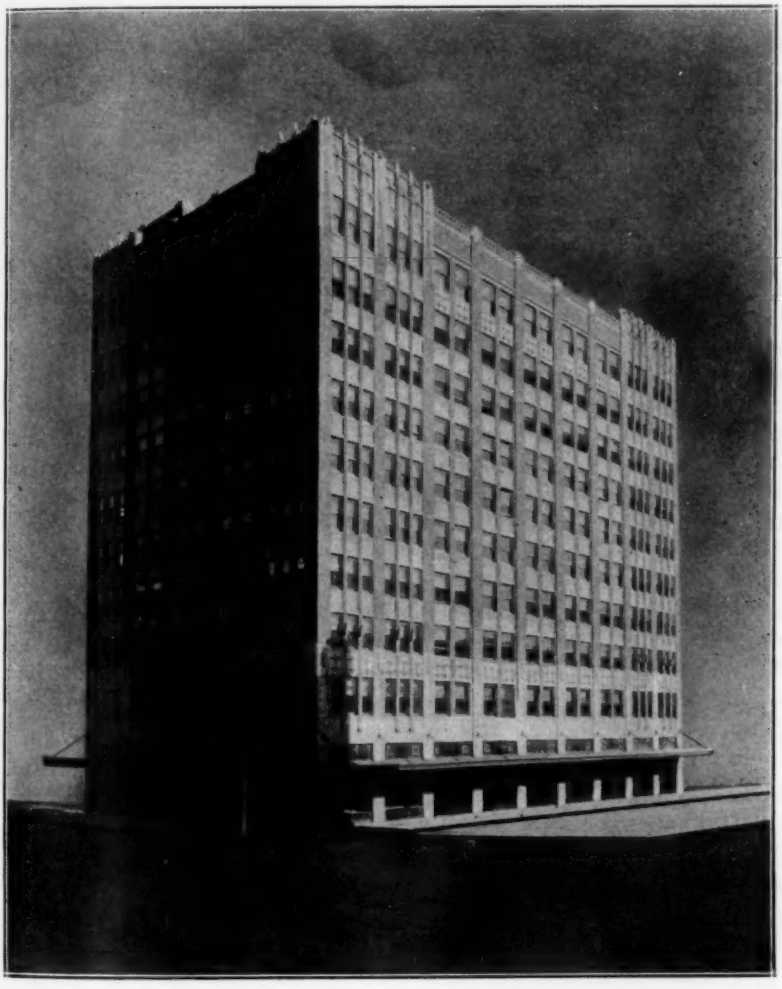
"Small Animals," by Dr. H. E. Standen, Springfield.

Good discussions followed the papers. A Vermont chicken dinner supplied the grand finale that brought the first day to a

successful close. The second day was devoted to clinics. Several interesting operations were capably performed.

A number of visitors were in attendance: Drs. A. A. Etienne and J. S. Jasmin, of Montreal, Canada; Dr. P. R. Baird, of Waterville, Me.; Dr. R. J. Pierce, of Claremont, N. H., and Dr. L. A. Treat, of Bennington, Vt.

G. N. WELCH, *Secretary.*



COMMERCE EXCHANGE BUILDING, OKLAHOMA CITY

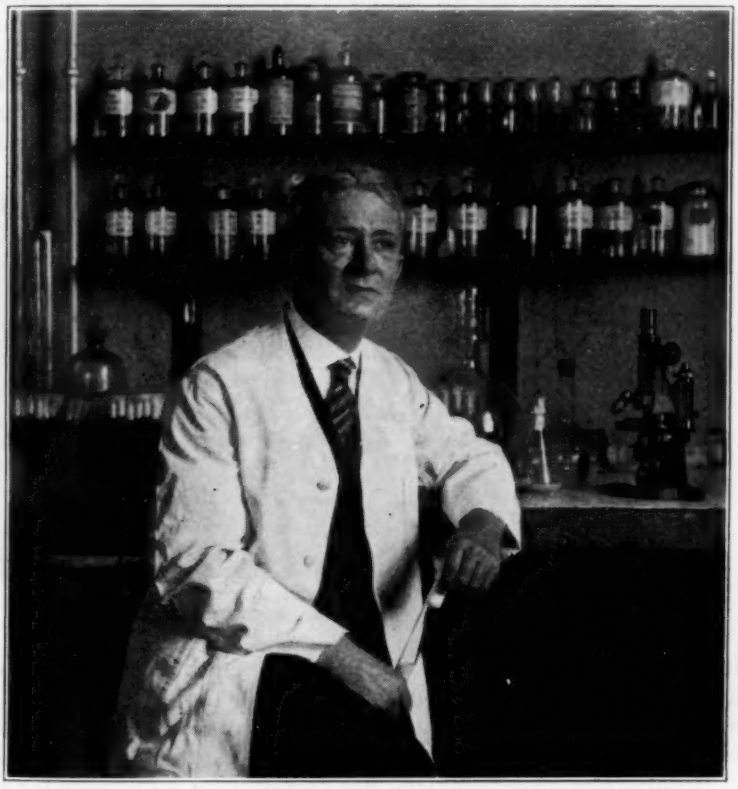
MARION DORSET

Death brought to a close the brilliant scientific career of Dr. Marion Dorset, at his home in Washington, D. C., July 14, 1935, after an illness of a few days. Coronary thrombosis was the cause of death. Dr. Dorset had been actively at work until a few days before his demise. Although he had many scientific achievements to his credit, undoubtedly Dr. Dorset was best known through his work in the development of anti-hog cholera serum, over a quarter of a century ago.

Born in Columbia, Tenn., in 1872, Dr. Dorset attended the University of Tennessee and was graduated in 1893, with the degree of Bachelor of Science. He then studied medicine for a year, at the University of Pennsylvania. He entered the service of the U. S. Department of Agriculture in 1894, as assistant chemist, and was assigned to the Biochemic Laboratory under the late Dr. E. A. de Schweinitz. While thus employed in Washington, he continued his medical studies at George Washington University and he was able to complete the work for the degree of Doctor of Medicine in 1896. Shortly thereafter, the Biochemic Laboratory became the Biochemic Division of the Bureau of Animal Industry, with Dr. de Schweinitz as chief. Dr. Dorset was made assistant chief on January 1, 1900, and succeeded Dr. de Schweinitz as chief, on February 15, 1904, a position which he held until his death. In 1915, Dr. Dorset received the degree of Doctor of Veterinary Medicine (*honoris causa*) from Iowa State College.

The scientific investigations conducted by Dr. Dorset during the forty years of his connection with the Bureau of Animal Industry, covered a very broad field. Without any question, his investigations of hog cholera brought him the greatest fame. These studies established the fact that the causative organism of hog cholera is a filtrable virus. The next greatest step was the development of a method for producing an antiserum, at first an extremely crude biological product as these are judged nowadays. Toward the close of the year 1905, Dr. Dorset and his assistants

demonstrated conclusively that a hog could be protected from hog cholera. In 1906, the method was patented by Dr. Dorset, all rights to its use being dedicated to the public, without the payment of any royalty. Ten years later, in 1916, a method for producing clear and sterilized anti-hog cholera serum was announced and the process patented as with the earlier process. Recent years have witnessed the introduction of improvements



Doctor Dorset in His Laboratory

and refinements that now place anti-hog cholera serum on a level with other similar products. As a matter of fact, it is today the most extensively used biological product.

With the creation of the Insecticide and Fungicide Board, December 22, 1910, Dr. Dorset was named as the representative from the U. S. Bureau of Animal Industry, at the same time being appointed chairman by the Secretary of Agriculture. He resigned in the fall of 1912 to devote more time to the research

work of the Biochemic Division. When the Virus-Serum-Toxin Act went into effect, July 1, 1913, Dr. Dorset was placed in charge, where he remained until February 17, 1917, when the Office of Virus-Serum Control was created as a separate section of the Bureau to carry out the provisions of this law.

Dr. Dorset was particularly interested in tuberculin. He supervised the production of all of the tuberculin used by federally employed veterinarians in the nation-wide campaign to eradicate bovine tuberculosis, which has been under way since 1917. During recent years, Dr. Dorset was much interested in the preparation of a new tuberculin, and, in a paper read at the meeting of the U. S. Live Stock Sanitary Association, in Chicago, December 6-8, 1933, announced the successful production of a tuberculin

FLORAL TRIBUTE FROM THE SERUM INDUSTRY

from cultures of tubercle bacilli on a synthetic, protein-free, liquid medium.* He worked out a formula for an ink that could be used for marketing federally inspected meats, and this one piece of work has saved the United States government millions of dollars through eliminating the necessity of using tags for the purpose. Dr. Dorset likewise proposed and outlined many investigations which his associates carried out with beneficial results to agriculture and public welfare. One of these was the rapid method of detecting pullorum disease in chickens, a discovery that has been a boon to the poultry industry.

Dr. Dorset was made an honorary member of the A. V. M. A. in 1912. He was a reporter at the Eleventh International Veter-

*Dorset, M.: A comparison of Koch's Old Tuberculin with a new synthetic-medium tuberculin. Jour. A. V. M. A., lxxxiv (1934), n. s. 37 (3), pp. 439-449.

inary Congress, at London, in 1930, on "Control of Swine Fever by Immunization," and at the Twelfth Congress, at New York, in 1934, on "Hog Cholera." He was a member of numerous scientific bodies, including the American Association for the Advancement of Science. He is survived by his widow, a son and a daughter.

JAMES ARMITAGE EMERY

Dr. James Armitage Emery, acting chief of the Biochemic Division, U. S. Bureau of Animal Industry, died at his home in Chevy Chase, Md., July 28, 1935, following a heart attack. He was 68 years old. He had been in his new position only two weeks, having been named to that office on the death of Dr. M. Dorset, chief of the Division, July 14. Dr. Emery became assistant chief of the Biochemic Division in 1904, having entered government service in 1891 as a research worker with special training in chemistry. In his work with the Division, he aided in improving methods of analysis used in the inspection of meats and meat food products, in developing formulas for dipping solutions used in controlling parasites of sheep and cattle, and in devising improved methods of producing tuberculin on a large scale. He also made a special study of insecticides and their application in the control of animal parasites.

B. B. BAKER

Dr. B. B. Baker, of Pine Bluff, Ark., died on March 13, 1935, while en route to a hospital in Denver, Colo. He was graduated from McKillip Veterinary College, with the class of 1908.

C. D. S.

RONALD MORASYN NYBLETT

Dr. Ronald M. Nyblett, of Victoria, B. C., Canada, died at his home, February 28, 1935. Death was due to angina pectoris.

Born at Hampstead, Middlesex County, England, April 22, 1867, Dr. Nyblett received his preliminary education in private schools before entering the Ontario Veterinary College, from which he was graduated in 1902. From 1903 to 1908, he served with the Royal Northwest Mounted Police. In 1908, he was appointed Veterinary Inspector, Health of Animals Branch, Canada Department of Agriculture, and served until 1911, when he re-

signed. He was reappointed in 1914 and served until he was placed on the superannuated list, April 22, 1932. He served mostly in western Canada, and was in charge of the port of entry at West Poplar River, Sask., for a number of years. He was stationed also at Wood Mountain and Lonesome Butte, Sask. Funeral services were held at Saint Matthias Church in Victoria, with members of the Royal Northwest Mounted Police Veterans' Association acting as honorary pallbearers.

Dr. Nyblett joined the A. V. M. A. in 1921. He is survived by his widow.

A. E. C.

A. A. TAYLOR

Dr. A. A. Taylor, of Mendon, Mo., took his life at his home, March 30, 1935. He had been ill for about a year with what had been diagnosed as gastric carcinoma. He was a graduate of Saint Joseph Veterinary College, with the class of 1909.

A. T. K.

CRAWFORD P. CALDWELL

Dr. Crawford P. Caldwell, of Durham, N. C., died in a local hospital, July 4, 1935, following an illness of several weeks with a heart ailment.

Born near Concord, N. C., August 11, 1892, Dr. Caldwell attended the North Carolina State College. Later, he attended the Kansas City Veterinary College, from which he was graduated in 1917. He joined the Veterinary Corps during the World War and was commissioned a second lieutenant on July 31, 1918. He was in training at Camp Lee, Va., before being ordered to active duty oversea. He was assigned to the Corps Mobile, Veterans' Hospital No. 4, on September 11, 1918, and discharged from service on August 13, 1919. He was commissioned a first lieutenant in the Organized Reserve, November 8, 1923. Dr. Caldwell served as meat inspector with the Winston-Salem (N. C.) Health Department from 1919 to 1920. He entered general practice at Wendell, N. C., in 1920 and remained there for two years. From 1922 to 1925, he occupied the position of assistant state veterinarian. In 1925, he accepted a position as meat inspector with the Health Department, at Durham, which position he held at the time of his death.

Dr. Caldwell joined the A. V. M. A. in 1926. He was a member of the North Carolina State Veterinary Medical Association,

and also of the North Carolina Food Handlers' Association. A prominent Mason, he was a Shriner and past master of the Durham Lodge. He was an active member of the American Legion. Surviving are his widow (née Helene Thomas), his parents and two brothers.

W. M.

VIRGIL F. PRUDEN

Dr. Virgil F. Pruden, of Condit, Ohio, died at his home on July 5, 1935, from a heart ailment. He was 44 years old. He was a graduate of Ohio State University, class of 1915. Dr. Pruden was commissioned a second lieutenant in the Veterinary Corps during the World War, July 16, 1917, and directed to report to the 87th Division, Camp Pike, Ark., for duty. There he served with the 312th Sanitary Train, Auxiliary Remount Depot, and the 173rd Infantry Headquarters. He was made a first lieutenant on March 7, 1918, and a captain on August 12, 1918. He served temporarily at Fort Barrancas, Fla., from March 18 to May 16, 1918, and later was assigned to duty at Camp Hancock, Ga. He received his discharge papers April 2, 1919, and located for practice at Waldo, Ohio, where he made his home until his removal to Condit two years ago. For several months prior to his death, Dr. Pruden was engaged in tuberculosis eradication with the U. S. B. A. I. forces in Ohio. Surviving are his widow, three sons, one daughter, his parents, one brother and three sisters.

HENRY WILLIAM KENNECKE

Dr. Henry W. Kennecke, of Edwardsville, Ill., died at Saint Elizabeth's Hospital in Granite City, Ill., July 5, 1935. Death was caused by a hemorrhage following an attack of appendicitis, for which he had undergone an operation only that day.

Born in Trenton, Ill., December 6, 1894, Dr. Kennecke completed his high school education at Trenton and entered the Chicago Veterinary College, from which he was graduated in 1916. He located at Granite City, where he practiced until he entered the service of the Veterinary Corps during the World War. He was commissioned a second lieutenant on August 13, 1917, and directed to report to the 86th Division at Camp Grant, Ill., where he was assigned to duty with the 171st Infantry Brigade. He was promoted to the rank of first lieutenant, June 1, 1918, and was a member of the American Expeditionary Forces oversea.

Following his discharge on July 9, 1919, Dr. Kennecke returned to Granite City, where he practiced for several years, and where he served as city meat and milk inspector. He then removed to Worden, Ill., remaining there until about two years ago, when he became a resident of Edwardsville. While at Worden, Dr. Kennecke became interested in politics and, for a number of years, was a Republican precinct committeeman from the Worden precinct of Omphghent Township. For eight years, he was supervisor of Omphghent Township and, in that capacity, became one of the leading members of the County Board of Supervisors. He served on a number of the most important committees and was suggested as a candidate for chairman.

Dr. Kennecke joined the A. V. M. A. in 1917. He was a member of Alpha Psi Fraternity. Surviving are his widow (née Wilma Marburger), two daughters, his mother, four sisters and a half-brother, Dr. L. J. Stortz (Chi. '08), with whom he was in partnership at the time of his death.

S. S. SNIDER

Dr. S. S. Snider, of North Hampton, Ohio, died at his home, July 16, 1935, following a stroke of paralysis. Dr. Snider was born in Clark County, Ohio, and received his preliminary education in the local schools before entering the Ontario Veterinary College, from which he was graduated in 1887. Following his graduation, he practiced in Champaign and Clark counties. He was a member of the Miami Valley (Ohio) Veterinary Medical Association, and also a member of the Junior Order United American Mechanics. Surviving are his widow, three daughters, one son and one brother.

ALEXANDER SEPTIMUS ALEXANDER

Dr. A. S. Alexander, professor emeritus of the University of Wisconsin and nationally known veterinarian, died at his home in Madison, Wis., July 12, 1935, following an illness of several months with a heart ailment.

Born in Glasgow, Scotland, July 7, 1860, Dr. Alexander received his early education at Glasgow Academy. From there he went to Andersonian College and later to the Glasgow Veterinary College, receiving certificates from both institutions. He completed work as a fellow of the Highland and Agricultural Society in 1882, and was awarded a gold medal by the Society

and by the Government Science and Art Department, of London. That same year, Dr. Alexander emigrated to the United States. He purchased a farm at Vinton, Iowa, where he remained until 1886. He was naturalized as an American citizen in 1887, returning to Scotland the same year to be married.

Until 1890, Dr. Alexander was editor of the *Farmers' Review* (Chicago), when he became professor of veterinary hygiene, zoötechnics, breeding and feeding in the Chicago Veterinary College, serving in this capacity until 1907. In the meantime, in 1903, he had moved to Madison to accept the newly created chair of veterinary science at the University of Wisconsin, dividing his time as lecturer between the University and the Chicago Veterinary College. He held this chair until 1930, when he was given emeritus status, although he retained an active connection with the College of Agriculture until 1932. Upon his retirement, he was given a testimonial dinner in the Great Hall of the Memorial Union, attended by 510 of his former students and fellow workers. On this occasion, a portrait, painted by Robert W. Grafton to hang in the Hall of Fame at the College of Agriculture, was unveiled.

Dr. Alexander was a man of many sides. In addition to his veterinary activities, he was a poet, an artist in water colors and oils, a scholar of original Greek and Latin, and a writer of more than ordinary ability. He was known for 40 years for his writings in agricultural papers throughout the United States, as well as for his contributions to Scotch and English publications. At one time, he was corresponding editor on veterinary and live stock management subjects for 37 weekly and monthly publications. He was the author, in 1906, of the Wisconsin Stallion Registration Law, the first of its kind in America, and one of the most influential factors in raising the standards of horse breeding in the country as a whole. The law has been a model for similar laws in virtually every state in the Union. In 1911, he founded the Pure Sire League.

Among Dr. Alexander's many activities, the Agricultural "Who's Who" lists the following: Veterinarian of the Wisconsin Experiment Station, 1903-1910; director of the Division of Horse Breeding, Wisconsin Department of Agriculture, 1917-1923; veterinary hygienist, World's Columbian Exposition, 1892-1893; consulting veterinarian, Saint Louis Exposition, 1904; official veterinarian, International Live Stock Exposition, Chicago, 1902-1903; veterinary inspector, Milwaukee Medical Society, 1908-1912. He was the author of a number of books: "Treatment of Border Leicester Ewes and Lambs," 1882; Verses in

Scotch," 1903; "Horse Secrets," 1910; "Udder Diseases of the Cow," 1927; "The Veterinary Adviser," 1929. He contributed also to "Farm Knowledge" and the "Book of Rural Life."

For many years, Dr. Alexander was an elder of Christ Presbyterian Church. He was an honorary member of Alpha Psi, and a member of Alpha Zeta, national honorary agricultural fraternity, and a number of other scholastic organizations. Surviving are his widow (née Mary Frances Hope) and three sons.

In commenting on the death of Dr. Alexander, Dr. F. B. Hadley, chairman of the Department of Veterinary Science at the University of Wisconsin, paid him the following tribute: "He had the rare ability as a lecturer of being able to move his audience from convulsive laughter to tears within a few minutes, thus impressing them with the high points of his message. This was accomplished by his skill in telling a story or relating an incident from his fund of wide practical experience as a veterinarian. His colleagues and friends often sought and always valued the advice and counsel which he so freely gave. The live stock industry of Wisconsin in the death of Dr. Alexander has lost a real friend and competent adviser. Many will mourn his death; more will miss his contributions in the rural press upon which they have learned to rely as guides in the management of their farm flocks and herds."

WERNER RUNGE

Dr. Werner Runge, of Madison, N. J., died on July 24, 1935, after an extended illness. He was 80 years old.

Born near Berlin, Germany, Dr. Runge came to this country when he was 17 years old, settling in Newark, N. J. He worked for three years as a surveyor, but lost his job in the depression of the seventies and returned to Berlin, where he entered the Royal Veterinary School of Berlin. Following his graduation in 1879, he returned to the United States and engaged in private practice at Newark, winning an appointment as veterinarian to the old Board of Health in 1885. With the growth of the veterinary and meat inspection bureau of the Board, he became chief of the bureau. In 1931, he was supplanted by a younger man, but took the case to court. Before a decision was handed down, however, the City Commission reinstated him.

During the bovine pleuro-pneumonia epizoötic of 1889, the federal government enlisted the aid of Dr. Runge in the campaign against the disease. He also conducted special investigations for the New Jersey Department of Health until the State Bureau of

Animal Husbandry was established to take over the work about 20 years ago. When the late Dr. Henry L. Coit, of Newark, and the late Stephen Francisco, owner of the old Fairfield Dairy, started the production of certified milk, Dr. Runge was one of their chief advisers. He arranged to import tuberculin from Germany for testing the cows, under the certified milk requirements established by Dr. Coit and the Essex County Medical Milk Commission.

Dr. Runge joined the A. V. M. A. in 1910, and was a frequent attendant at the A. V. M. A. conventions. He served as A. V. M. A. resident secretary for New Jersey, 1922-23. He was a member of the Twelfth International Veterinary Congress, and of the Veterinary Medical Association of New Jersey from the early days of its organization. Surviving are his widow, three sons, a daughter, and a sister. J. G. H.

PERSONALS

BIRTH

To Mr. and Mrs. G. S. Muir, of Bridgnorth, England, a son, June 30, 1935.

PERSONALS

Dr. M. H. Rolighed (Ind. '23) has removed from Appleton, Wis., to Roseau, Minn.

Dr. Joseph A. Tognotti (San Fran. '06) has removed from Crystal Springs, Miss., to Leland, same state.

Dr. J. G. Catlett (U. S. C. V. S. '16), of Miami, Fla., has been spending the summer at Elmont, L. I.

Dr. E. P. Durham (O. S. U. '08) has requested a change of address from Bountiful, Utah, to Alhambra, Calif.

Dr. Houston Odom (A. P. I. '30), formerly of Auburn, Ala., is now located at 402 W. Lloyd St., Pensacola, Fla.

Dr. Robert S. Warnock (O. S. U. '35) is practicing with his father, Dr. W. W. Warnock (Ont. '04), at Aledo, Ill.

Dr. L. H. Morin (Chi. '10) is building and equipping a hospital for small animals in connection with his practice at Clinton, Ill.

Dr. C. A. Manthei (Mich. '35), formerly of Janesville, Wis., is now associated with Dr. N. D. Backus (Corn. '05), at Elyria, Ohio.

Dr. M. C. Fitzwater (Gr. Rap. '06), who has been located at Canton, Pa., has returned to Paw Paw, Mich., where he formerly practiced.

Dr. A. E. Harding (Ont. '16), of Morrison, Ill., has had his contract as Whiteside County Veterinarian renewed for a period of three years.

Dr. J. H. Cheney (K. S. C. '07), who has been located at Norwood, Colo., for the past four and a half years, has returned to Great Bend, Kan.

DR. FRED L. RICHELIEU (Wash. '29), meat inspector for the California Department of Agriculture, who was formerly located at Davis, is now located at Dixon.

DR. H. R. SHIPMAN (Gr. Rap. '14), of Ann Arbor, Mich., has been appointed humane officer by the Board of Directors of the Ann Arbor Humane Society.

DR. F. D. MARKHAM (Ont. '95-Chi. '05), of Port Leyden, N. Y., recently ordered an A. V. M. A. automobile emblem for his new 1935 airstream Chrysler.

DR. W. M. HOOTON (McK. '08), who has been practicing at Danville, Ill., for the past 14 years, has returned to Arcola, Ill., where he was located before going to Danville.

DR. L. G. STORTZ (Chi. '08), who has been employed by the Illinois State Department of Agriculture for some time, has resigned to engage in practice at Edwardsville, Ill.

DR. ESMOND V. SMITH (Wash. '35) has requested a change of address from Puyallup, Wash., to Albany, Ore., where he expects to be located for the balance of the present year.

DR. GUY F. ABELL (U. P. '35) is now associated in practice with Dr. Benjamin McInnes (R. C. V. S. '74) and his son, Dr. B. Kater McInnes (U. P. '11), at 57 Queen Street, Charleston, S. C.

DR. R. A. RUNNELLS (Mich. '16), according to a postal card mailed from Berlin about the middle of July, had already visited the veterinary schools at Leipsic, Zurich, Munich and Berlin.

DR. WALTER SHAW (Ont. '81), of Dayton, Ohio, was the guest of honor at the annual meeting of the Ontario Veterinary Association, held at the Ontario Veterinary College, Guelph, July 16-18.

DR. W. F. HEYDE (Ont. '94), of Saint Louis, Mo., is now able to be out again after having been confined to the hospital and later to his home with a basal fracture caused by a fall early last November.

DR. CARL OLSON, JR. (Iowa '31), who has been on the staff of the Mayo Foundation, at Rochester, Minn., for several years, has accepted a position at the New York State Veterinary College, at Cornell University.

DR. H. L. COTTON (O. S. U. '13), who has been on the meat inspection force of the U. S. Bureau of Animal Industry at Detroit, Mich., for a number of years, has resigned to enter practice at Milford, Mich., about September 1.

DR. J. S. GORDON (Iowa '30), Sergeant Bluff, Iowa, has been in the service of the U. S. Bureau of Animal Industry for about a year, engaged in federal work at various points. He has given Hartington, Neb., as a permanent mail address.

DR. WIRT R. BARNARD (K. C. V. C. '09), of Belleville, Kan., has been appointed a member of the Kansas State Board of Veterinary Examiners, succeeding Dr. E. G. L. Harbour (West. '05), of Lawrence, whose term expired in March of this year.

DR. T. B. HINKLE (O. S. U. '12), of Ashley, Ohio, major in the Veterinary Reserve Corps, recently accepted appointment to active duty in connection with CCC meat and milk inspection and has been stationed at Camp Knox, Ky. Major Hinkle will direct all sanitation activities and, in addition, will do supervisory work for 27 CCC camps in Kentucky.

DR. F. J. BOLENDER (U. S. C. V. S. '14), formerly of San Diego, Calif., who has been on active duty with the Veterinary Reserve corps for the past few months, is now district veterinarian in the CCC for the Montana District, with headquarters at Missoula. Lt. Bolender reports that he has been on the move since the first of the year, having been on duty at three different stations within 60 days.